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The Medical Society of London
with the Editors Compts

MEDICAL SOCIETY OF LONDON

ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY;

A Monthly Record

OF

BRITISH AND FOREIGN MATERIA MEDICA, PHARMACY,

AND

CHEMISTRY, THEORETICAL AND TECHNICAL.

EDITED BY

WILLIAM BASTICK AND WILLIAM DICKINSON,

Members of the Pharmaceutical Society.

VOLUME I.

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PREFACE.

THE rapid growth of periodical literature is one of the characteristic features of the day; but, however rapid it has been in some respects in this country, it has scarcely kept pace with the times, in the particular branch to which our exertions are devoted.

A periodical journal is eminently adapted to answer purposes which cannot be attained by books. By its agency, materials provided elsewhere are presented with such regard to adaptation, variety, and quantity, that the intervals of business may be turned to profit, and the most occupied amongst us may, by this means, derive something from the stream of knowledge, at once affording themselves recreation and improvement, and turning to advantage time that otherwise might be lost or misspent.

In commencing the publication of a Periodical Journal devoted to Chemistry and Pharmacy, the numerous attempts and failures that have preceded us in establishing, on a permanent basis, works of the same nature, in some degree filled our minds with doubt as to the ultimate fate of our humble endeavours, though in some measure we must freely admit that the example and disasters of our predecessors rather stimulated than disheartened, although common prudence dictated caution, and warned us not precipitately to launch our frail bark upon the same treacherous sea, which had so ruthlessly wrecked and swallowed up the good intentions and efforts of others, who doubtlessly had far fairer prospects and better hopes of success than we ourselves possessed at the outset of our career as journalists.

The temerity of the undertaking in our case will in some degree be palliated by the well known fact, that a monopoly in Pharmaceutical journalism at present exists, of the most iniquitous kind, and without precedent in the history of journalism,—

such a monopoly as all those with the least spark of independence must condemn, more especially when this monopoly is perverted to party purposes of the most unworthy kind. Deploring, and indignant, that an excellent institution and its supporters should be thus yoked, and taunted with the insinuation, that the Chemists and Druggists as a body were incapable of conducting a Journal devoted to their class; unprepared, and almost without premeditation, and in the face of a compact clique, we resolved that "THE ANNALS OF PHARMACY" should come forth, and battle through those rocks and quicksands, and encounter those dangers that have proved so fatal to others that have steered the same course; how successfully our task has been accomplished, it is not for us to decide, but we willingly leave that matter to the friendly criticism of our readers.

In completing the First Volume, our feelings prompt us, with considerable gratification, to take this opportunity of acknowledging and publicly expressing our appreciation of the hearty approval "THE ANNALS OF PHARMACY" has met with, as testified by the large number of subscribers, and also by the many and cordial communications addressed to us, from time to time, cheering us on in the self-imposed duty, which has been performed amidst the anxieties and turmoil of our usual business avocations, and which duty, we believe, has been so conducted, and upon such principles, that the most fastidious, we hope, will not cavil at; for we can most honestly aver that we do not seek for ourselves any unfair position, popularity, or advantage over our compeers; our sole object being to show that a Journal can exist without being made the medium of selfishness and personal aggrandizement, and to dispel the aspersion cast upon our class,—that none but an individual amongst us was capable of doing that which we have no hesitation in asserting hundreds of our body are able to perform, especially if the paralyzing monopoly that we have previously indicated were destroyed.

The march of intellect, and the free trade principles of the day, are sufficiently illustrated by the many prosperous undertakings conducted by private enterprize, unaided either by grants, subsidies, or official patronage, the very life-blood of them being that fair and honourable competition which rouses those talents and energies, that would otherwise ever remain dormant under the withering and corrupting influence of official sunshine.

We have been represented as antagonistic to the best interests of the Pharmaceutical Society, and as enemies to its welfare. The allegation we emphatically deny, and without scruple assert that indirectly we have been and are amongst its most ardent supporters, and, by the course we have pursued, have done good service for the interests of the members at large. We desire nothing so much as the prosperity of an institution which, if administered with a view to benefit equally all its members, and to maintain the integrity of its legitimate objects, must ultimately tend to raise the standard of qualification, and, consequently, the position of the Chemists and Druggists of this country. Our voice has been raised not against the use, but against the abuse of the Society for individual purposes, and never against the proper functions of this institution, which alone are worthy to be fostered.

In further pursuing our task, we shall devote our best energies to fulfil the wishes of our subscribers, which are so frequently conveyed to us in the way of suggestions, sometimes impracticable, but, nevertheless, acceptable, as evidencing the interest taken in our welfare. With regard to the scientific contents of "THE ANNALS OF PHARMACY," we need not remind our friends that we have placed before them a mass of information, derived from various sources, which must have been utterly lost had it not been for the existence of our pages; because we have proceeded on the plan of avoiding either filching from our contemporaries, or publishing anything but that which was obtained through original channels.

It becomes our pleasing duty on this occasion to thank those gentlemen who have furnished us with original papers for publication, and also those who have interested themselves to promote the circulation of our Journal; such exertions we shall always most gratefully acknowledge.

Firmly believing that the enterprize and industry of British Pharmaceutists will, at no distant day, so elevate their professional position, as to enable them to take their proper rank as scientific men, we are stimulated to proceed hopefully in our endeavours to assist in accomplishing these desirable results.

THE EDITORS.

London, 25th November, 1852.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN LONDON

THE ANNALS OF PHARMACY AND PRACTICAL CHEMISTRY.

ON THE NATURE, IMPORT, HISTORY AND LITERATURE OF PHARMACY,

BY JUSTUS LIEBIG, M.D.,

Professor of Chemistry, at the University of Giessen.

PHARMACY forms a part of natural philosophy, and comprehends the collection, preparation, and preservation of medicines, and teaches how properly to dispense the same.

Natural philosophy, on the other hand, embraces in its most extensive term all objects which our senses are able to perceive, and endeavours to discover their properties and phenomena.

A branch of this science is occupied with collecting observations on natural objects, whilst in a state of rest, and to ascertain and describe their external appearance, such as size, form, &c. This part of natural philosophy is also called description of nature, or natural history, and is divided into mineralogy, botany, and zoology.

Another branch of this science is devoted to the study of the changes which occur in natural objects, and comprehends astronomy, physiology, and pathology, &c.; and those sciences which study to explain the causes of these changes, such as physics and chemistry. Pharmacy is obliged to borrow from the different portions of the natural sciences all the knowledge which has the least affinity to medicines.

Difference between remedies, drugs, medicines, and poisons.

Remedy, is a term more comprehensive than medicine; all that which under certain circumstances may act favourable changes upon the sick is called a remedy; hence air, light, heat and cold, mental and bodily exercise, different kinds of food and drink, nay, even the surgeon's knife, are remedies. These things, however, are also useful for other purposes, and cannot properly be named in a classification, but are sometimes drugs or medicines.

We call drugs or medicinal agents, only those objects of nature, or products of art, which, generally if not exclusively, are employed in the treatment of the sick. Hence a remedy is not always a drug or a chemical, nor is a drug always a remedy.

Medicines are properly those drugs and chemicals which are prescribed by a physician according to a certain form.

It is difficult to draw a line of perfect separation between poison and medicine, since poison often acts as medicine, and *vice versa* medicine is oftentimes an effectual poison. Yet, according to the general opinion, those drugs are called poisons, which, when brought into contact with

the living animal organismus, that is, administer internally or applied externally, produce even in small doses serious accidents, and even death.

The number of remedies is at the present time very great, and is daily increasing; and though many of them in modern times have been discarded as useless and ineffectual (some unjustly so), and many more are being introduced afresh.

Medicines are derived from all three compartments of the natural kingdom, and even from those productions which are chiefly known as objects of food or as drugs used in manufactures. Hence it is evident how comprehensive and important pharmacy is. It requires a systematic knowledge of zoology, and in particular of botany, mineralogy, physical science, and chemistry. A thorough knowledge of the last is indispensable for the proper preparation of medicines. To which must be added the important part of the business, that of properly mixing and dispensing, which must be acquired under good guidance by long and assiduous practice.

Therefore, we must look upon pharmacy, not as upon a mere trade, but a scientific art, as a part of medical science, aiming to preserve man's greatest good, his health and his life.

The great importance of this profession requires that, he who devotes himself to this calling, should be possessed of all the knowledge and artistic skill above-mentioned. Moreover, the dispensing chemist must be a man endowed with a high sense of honour and morality, and one who looks upon his calling as a sacred duty, and exercises the same faithfully and conscientiously. Hence the natural consequence, that he will always keep the best drugs and chemicals, and will never commit himself by making changes, or adulteration in dispensing that which is prescribed by the physician.

Pharmacy, thus scientifically understood and conscientiously practised must needs ensure those who exercise it, not only a sufficient competency but a social position equal to that claimed by the physician.

OUTLINES OF THE HISTORY OF PHARMACY.

FIRST PERIOD.

Pharmacy in the hands of the physicians.

The Hippocratic period until the time of Scribonius Largus, forty-three years after the birth of Christ.

The history of pharmacy goes hand in hand with that of medicine. Simple, and not much refined must the first remedies have been, like the manners and customs of the people who employed them; none then were thinking of difficult and complex compounds.

The first and oldest physicians made up their own medicines, and watched that they were duly administered to their patients. In progress of time, when medicine assumed a more scientific form, the physician instructed persons for the special purpose of collecting and dispensing medicines.

A thousand years before the birth of Christ, the Asclepiades prepared in the temple Cos, vegetable extracts, cataplasms, potions, and salves, and their performances must be considered as the first

rudiments of pharmacy. On the other hand, those who, at the same time, or even afterwards sold medicines under the denomination of salvers, plaisterists, medicinemongers, and pharmacopoli, deserve not the name of pharmaceutists, they were nothing but colourmen, poison mixers, and nostrummongers or quacks.

The first who deserve the name of physicians started from the temples of Cos and Cnidos; they began to throw off the veil of mysticism, and to lay the foundation of an art founded upon the experience and observation of nature. Among them the most eminent place belongs to Hippocrates, the son of Heraclides. In his works we must also look for the first indications of experimental pharmacy. Next to Hippocrates, some other men deserve mention, for having added new medicines to those already known, or for having taught a better method of dispensing them, as Dyocles of Carystus, Praxagoras of Cos, Chrysippus of Cnidos, Theophrastus of Eresus, Nicander of Calopho, Heras of Cappadocia. From these times, dates the separation of medicine from dietetics, surgery, and pharmacy, which was brought about by the school of Alexandria. This division has influenced the preparation of medicines, because, only those who cured by internal remedies, and prepared medicines, were called pharmaceutists; whilst the physicians who cured only by the strict rules of diet, were called dietetics; and those who performed manual operations only were called surgeons.

However, it is erroneous to believe, that pharmacy, as an independent science, was known at that epoch.

The Galenic period, until the deliverance of the apothecaries in Bagdad, 765 years after the birth of Christ.

There may, however, have existed many books, containing separate treaties on medicine, and their preparations, in the latter half of the previous period; but they are all lost with the exception of few fragments. The only complete work on pharmacy extant, is that of Scribonius Largus, who lived in the reign of Emperor Claudius. His compositiones medicæ, must be regarded as the oldest pharmacopœia in existence, and as containing the most precise instructions, concerning the mode and the rules, after which medicines were then compounded.

Several among the Greeks and Romans have likewise earned immortal laurels, for their eminent services to materia medica, and pharmacy, particularly Dioscorides of Anazarba, Claudius Plinius, and Galenus of Pergamus. The last especially rendered enduring benefits to pharmaceutical progress and knowledge.

SECOND PERIOD.

Pharmacy, an independent science.
From the Arabians, until the present time.

With the fall of the Roman empire, through the invasion of northern nations, arts and sciences left Europe, and found a shelter among the Arabs, who preserved them for more propitious times; and though their genius never has equalled that of the Greeks and Romans, nevertheless, chemistry and pharmacy are much indebted to them.

They discovered several chemical preparations, and introduced several new medicines, still employed by all physicians. They established, in the eighth century, the first public Apothecaries Hall in Bagdad, and thus elevated pharmacy to an independent science. We owe also to the Arabs, for the first legal dispensatories, in the ninth century, namely, for the one of Ebn Sahel; and in the twelfth century, for that of Abu Hassan Hebalollah Ebn Talmid.

Among those who were most instrumental in cultivating pharmacy among the Arabs, we must name Rhazes of Ray in Irak, Geber of Harran in Mesopotamia, two Serapions, Mesue of Maridni on the Euphrates, Avicenna of Lakhara, Aben, Gnefith, &c.

Whilst chemistry and pharmacy were cultivated industriously in the East, Europe was plunged in darkness and ignorance, when at length a new light was kindled by Constantine of Carthage, who established the first regular pharmacy in Europe, namely, in Salerno. He called these establishments stationes, and the dispensing chemists confectionarii. The progress of pharmacy in Europe was further advanced, first, by the large collection of recipes made by Nicolaus Præpositus of Alexandria, which may be regarded as the first dispensatory; and secondly, by the regulations of the Emperor Frederick the Second for pharmacies, which contain stringent enactments for the proper dispensation of medicines.

However, though pharmacy was thus established in Europe, it was still in its infancy, since ignorance and superstition were opposed to the advancement of natural philosophy and pharmacy. Among the few who, in this age of darkness, strove to advance this science, we may record the names of John of Dondis, and Saladin of Asculo, whose works were in great repute, but which, now, are mere historical monuments.

The end of the fifteenth and the beginning of the sixteenth century are marked with a fresh impulse given to all sciences. Ortolf of Bavaria wrote, A.D. 1477, the first German pharmaceutical work; and several chemist shops were established in Germany and elsewhere. The imperial town of Augsburgh possessed, A.D. 1573, her own dispensatorium written by Occo; and much earlier, the free imperial town of Lindau had her own medicinal tax, or list of prices, published and printed 1538. Chemistry had already begun to extend influence over pharmacy through the labours of Raimundus Lullus, Basil Valentine, and Paracelsus, who introduced many mineral and chemical remedies, and must be considered as the founder of chemical pharmacy.

Pharmaceutical chemistry is also greatly indebted to Turneisen, Croll Libavius, Van Helmont, Majow, Mynsicht, Silvius Glauber, one of the greatest chemists of his time; Chomel Stahl, the founder of the phlogistic system; Boerhaave, Cartheuser, Dippel, Geoffroy, Neumann, Boyle, Beguin, Minderer, Hoffmann, Lemery, Zwoelfer Kunkel, Becker, Markgraf, Lowiz, Scheele, who with Priestley, discovered oxygen, and enriched chemistry with many new facts, Wiegleb, Westrumb, Meyer, Gren von Crell, Goettling, Hagen, &c.

About the same time, botany began to start from its infancy; Ottho Brunfels published his new German herbal with excellent woodcuts; his

example had many followers, who contributed towards the improvement of this most valuable part of pharmacy. The most renowned botanists of this epoch are Tragus, Mattioli, Gessner, Caesalpinus, Clusius, Lobelius, John and K. Bauhin, Tournefort, Linnæus, the immortal founder of the sexual system; Jussieu, the founder of the natural system; Haller, Gleditch, Jaquin, Gaertner, Batch, &c.

Lavoisier, the founder of the antiphlogistic system, through whose genius many important changes and discoveries in chemistry originated, deserves a most luminous place in the history of pharmacy. After him, natural philosophy, chemistry, and pharmacy, owe their immense progress to the discoveries of Volta and Galvani, and to the doctrine of chemical proportions, originally broached by Richter, but elevated to the standard of exact science by the immortal Berzelius.

By the labours of these and many other modern chemists and natural philosophers, pharmacy has acquired such a high degree of importance, as to require from him, who follows it up as an avocation, the most profound scientific study. To facilitate this study, it is useful to divide pharmacy in two distinct parts, the practical, which teaches how to prepare and dispense medicines; and the theoretical, which affords the necessary instruction about all which concerns the natural history, chemistry, and natural philosophy, of all substances, which are prepared and dispensed as medicines. And though this division cannot always be strictly kept up, yet it is useful to have it constantly in view as a compass to direct the student in his scientific voyage.

The accurate preparation of most medical agents, especially of chemical compounds, renders chemistry a science of the utmost importance and necessity to the pharmaceutist. Natural philosophy is so inseparably bound up with chemical operations and theories, that a knowledge of it is almost unavoidable and indispensable. To the understanding of the intricate laws of physics, a knowledge of mathematics is necessary, but for an intimate acquaintance with chemistry, their assistance is not so absolutely required. However, the cultivation of mathematical science is at all times to be recommended as a sharpener of the reasoning faculties, and a preliminary exercise for the mind.

THE COMBINATION OF ARSENIOUS ACID AND ALBUMEN,

WITH REMARKS ON LIEBIG's THEORY—AND THE STRONG EXPERIMENTAL PROOFS IN ITS FAVOUR.

BY DR. SHERIDAN MUSPRATT, F.R.S.E.,

Membre de la Société d'Encouragement, Professor of the College of Chemistry, Liverpool, &c. &c.

. Science can only be outraged by the dissemination of illogical theories and imperfect results, &c.; against such every honest man and every true lover of science will very properly declaim.

It is my full belief that Liebig's beautiful theory with regard to poisons, would not have met with any opposition up to the present

time, if a person or persons, had not taken the opposite side of the question merely for the sake of a "leetle" notoriety. There are some people in the world who can only pride themselves, upon differing with a great man, and I am firmly of opinion, that we should never have had the following proposition written by Mr. John Baker Edwards, of Liverpool, in the nineteenth century, if the above were not *strictly* true. "If water so readily extracts arsenious acid both from the compounds formed in the laboratory, and from those which nature has prepared, surely we may conclude that its retention is simply mechanical, and affords no ground for the theory which that eminent chemist Liebig, has raised upon it." In speaking with Liebig, recently, upon the above remarks, he replied almost as follows:—"There will always be men ready to carp at the sayings and doings of their superiors, but if I were to take up my valuable time in answering them, I should not have any time left to devote to other and more useful purposes. I know, and you do, from experiment, that albumen does form insoluble compounds with arsenious acid, and mercury; consequently, any repetition on my part would be superfluous." I shall lay before your readers, all the experiments that have been made, and will introduce some comments, here and there, for the purpose of showing that even the non-supporters of the theory prove its truth. There is something in a name, consequently, before entering on the matter, I wish to prove to your readers, the reliance they are to place upon the results from which I have quoted the above extract, (Chem. Soc. Trans. 1850, vol. iii., p. 14.) Some time ago, samples of bread and flour were sent to Dr, Letheby, Dr. Hassall, and myself, for the purpose of ascertaining if they contained alum. We all found a certain and the same quantity of alum. Mr. Edwards was favoured with a sample of the same bread; and he stated, "I have no hesitation in pronouncing both bread and flour, *perfectly free* from admixture with alum. . . . The portions I operated upon, were too small for me to decide whether alumina actually existed in the bread." *The latter sentence contradicts the former.* There certainly was alum in the loaves and flour. Mr. Edwards, could not detect any. Am I not justified then in asking the question,—Is he capable of detecting the presence of small quantities of arsenious acid in an albuminous compound? He says, " . . . and afterwards *failed to detect* it (arsenious acid), in the coagulate." How often are traces of phosphate of lime passed over in unexperienced hands? He further gives it as his opinion, that Liebig is wrong without adducing any proofs in support of his vague assertions. If it were a Faraday, a Graham, a Dumas, a Mitscherlich, or a Gregory, that had given opposite results to the world, there might be some truth in the statements, *i.e.*, they might with justice be regarded as resulting from analytical accuracy; but in the case of Mr. Edwards it is different. The crude experimentalist is "not a recognised chemist;" therefore, it is really absurd to bring his views again before the public, and especially in conjunction with high and established authorities.

Before giving the results or opinions of Mr. Mercer, Mr. Danson, Professor Gregory, Sir Robert Kane, Dr. Anderson, Mr. Gaskell, Mr. Fairrie, Mr. Forster, and myself, &c., I shall append a few extracts

from Baron Liebig's chemistry of physiology, to show how often the combination of arsenious acid and mercury, &c. with albumen, is alluded to in two or three pages.—"These," he says, "are the true inorganic poisons, the action of which depends upon their power of forming *permanent compounds*, with the substance of membranes and muscular fibres." "When solutions of these salts are treated with a sufficient quantity of albumen, milk, muscular fibre, and animal membrane, *they enter into combination* with those substances, and lose their own solubility." And again—"The action of arsenious acid and corrosive sublimate, is very remarkable in this respect, *i.e.*, they produce morbid phenomena by entering into combination with the organised parts of the body, therefore, disturbing the functions of those parts, and acting as poisons." Further—"Arsenious acid *enters into a very firm combination* with membranes and gelatinous tissues." "The arsenious acid, *combining with those tissues*, gives them the power of resisting decay or putrefaction." "It is further known, that the parts of a body which come in contact with these substances during poisoning, *and which, therefore, enter into combination with them*, do not afterwards putrefy, so that there can be no doubt regarding the cause of their poisonous qualities." "If a vein be exposed and surrounded with a solution of arsenious acid, every blood globule *will combine with it*."

"The compounds of arsenic, which have not the property of entering into combination with the tissues of the organism, are without influence on life, even in large doses. Many insoluble basic salts of arsenious acid are known not to be poisonous. The substance called alkargen, discovered by Bunsen, has not the slightest injurious action upon the organism; yet it contains a very large quantity of arsenic, and approaches very closely, in composition, to organic compounds." "All substances, administered as antidotes in cases of poisoning, act by destroying the power which arsenious acid and corrosive sublimate possess of *entering into combination* with animal matters, and of thus acting as poisons. Unfortunately, no other body surpasses them in that power, and the compounds which they form, can only be broken up by affinities so energetic, that their action is as injurious as that of the above named poisons themselves." "When the action of arsenious acid or corrosive sublimate is confined to the surface of an organ, those parts only are destroyed which enter into combination with it; an eschar is formed which is gradually thrown off."—Such are the few extracts from the great German physiologist's work on this subject.

Mr. Mercer, citing his results when examining this compound, says, "He took 100 grains of albumen, and one grain of arsenious acid, and coagulated by heat. He boiled the coagulate in water, and could only get a small stain by Marsh's test; on decomposing the organic matter, the proof was abundant. He therefore thinks that combination had taken place."

Mr. Danson states:—"I took the white of a perfectly fresh egg, and mixed it with a large quantity of dissolved arsenious acid, and triturated well for some time, then coagulated the mixture by heat. My product was a snow-white substance possessing an agreeable smell; when washed with cold water, it gave no indications of arsenic. The residue on

the filter was dried, and its organic matter *carefully* destroyed by *pure* sulphuric acid; the black acid fluid, when submitted to Marsh's apparatus, gave *large bright black stains* of metallic arsenic, a proof of the existence of the compound mentioned by Liebig."

Professor Gregory.—" He performed some experiments in Dublin in 1837, which satisfied him that Liebig was right."

Sir Robert Kane.—" The compound of albumen with arsenious acid and other acids, *is somewhat soluble;* with metallic oxides, insoluble."

Dr. Anderson.—" There is, in my opinion, no doubt that the metallic poisons are capable of uniting with animal matters, and this, I apprehend, is perfectly well known to all toxicologists, and is the universally received explanation of their antiseptic properties."

Dr. Muspratt.—" I took 0·107 grm. of dissolved arsenious acid and 12·67 grms. of the glairy albumen of eggs. They were intimately triturated together for about twenty minutes, coagulated by heat, and evaporated to dryness in a water-bath. The white residue, affused with distilled water and filtered, yielded a filtrate which gave *no deposit* of arsenic on copper by Reinsch's test, nor any stains on porcelain by Marsh's apparatus. When the residue on the filter was heated with pure sulphuric acid, and then submitted to the preceding experiments, arsenical indications were immediately obtained, proving that a combination of arsenious acid and albumen had occurred. The albuminous compound is sparingly soluble in boiling water, so that, when affused a sufficient time, *i.e.*, by using quarts or gallons of hot water, the whole of the albumen and arsenious acid might, with time and patience, be washed away."

Mr. W. Gaskell, of Manchester.—" I took 26·807 grms. of albumen, triturated it in a mortar, then added ·208 grm. of arsenious acid, previously dissolved in about four ounces of water, triturated, coagulated by heat, and evaporated to dryness. I next pulverised the brownish yellow residue in a mortar, placed it on a filter, and edulcorated with forty times the bulk of water previously used to dissolve the arsenious acid; I could detect traces of albumen and arsenious acid in all my washings, *but never arsenious acid alone.* I tested the residue for arsenious acid, and detected a large quantity. Now, if no compound is formed,—why was not the whole of the arsenious acid dissolved out by a quantity of water ten times more than is required to effect its solution?"

Mr. Adam J. Fairrie.—" 30·097 grms. of albumen were triturated for some time, I then added 0·307 grm. of arsenious acid, previously dissolved in about three ounces of water, triturated them together for half-an-hour, coagulated by heat, and evaporated to dryness at 212° F. The brownish residue was then pounded and washed with about forty times as much water as was used to dissolve the arsenious acid. I detected arsenious acid and albumen in all the washings. Arsenious acid was also detected in the residue by Marsh's and Reinsch's test, which evidently shows that a very firm combination of arsenious acid and albumen was formed, frugally soluble in water."

Mr. R. W. Forster of Whitehaven.—" I weighed out 36·24 grms. of albumen of eggs and triturated them for some time in a mortar. I

then dissolved ·415 grm. of arsenious acid in about five ounces of hot water, allowed the solution to cool, and added it to the albumen in the mortar. The mixture was next triturated for twenty minutes, coagulated, and evaporated to dryness on the water bath. The dry residue was then reduced to powder, thrown on a filter, and washed with boiling water until no arsenious acid could be detected in the filtrate. In the whole of the washings, (which amounted to nearly a gallon and a half,) albumen was detected, and, in the first portions, arsenious acid also in considerable quantities. When the washing was completed, the residue on the filter was boiled with pure sulphuric acid, and submitted to Marsh's test, but no arsenical indications were obtained."

Dumas, in treating of the combinations of albumen and metallic oxides, remarks,—" These combinations are difficult of decomposition, and the metallic oxide *can only be entirely separated* by destroying the animal matter. The mercury compound is soluble in several saline liquids, therefore, when white of egg is used as the antidote to the poisonous effects of corrosive sublimate, chloride of sodium should be avoided in order to prevent the solution *of the compound* in the secretions of the stomach."

Berzelius states,—" Sulphate of albumen is always formed when albuminous solutions are precipitated by an excess of sulphuric acid; *it may be decomposed* (evidently showing that combination has taken place) and the acid abstracted by carbonate of ammonia. Even after continued washing, sulphuric acid and albumen may be detected in the coagulum."

Perhaps Mr. Edwards will attempt next to refute the great Berzelius? Chloride of mercury forms an insoluble compound with albumen;—by long washing, however, with boiling water, mercury and albumen are detectable in the filtrate. Mr. Herapath, of the Mansion House, Bristol, has lately entered the field on the arsenious acid and albumen controversy, and although he evidently took up the subject to find Liebig wrong, still, his own experiments have foiled him in the attempt. I give the one that is the most in favour of " a very firm combination" being formed. I will not call into question Mr. Herapath's chemical attainments. His results, to use his own words, " may be said to speak for themselves; therefore, it is quite unnecessary for me to offer any observations upon them."

Mr. Herapath's first experiment :—" 499 grains of the glairy albumen of eggs were taken and intimately mixed, by long continued trituration, with three grains of arsenious acid; the latter having been previously dissolved in a quantity of water sufficient to effect a perfect solution. The mixture was then coagulated by heat, and afterwards carefully evaporated to dryness on a water-bath. The yellowish residue *thus obtained was reduced to a very fine powder in a mortar, and repeatedly digested, for several hours together, in boiling water*, care being taken to reduce the compound to a *still more minute state of division by patient trituration in a mortar, after each digestion, &c.;* the washings, on being tested by Reinsch's process, were found to contain a large portion of arsenious acid. The insoluble residue having been digested in water for about *twelve or fifteen hours*, as before described, was dried and

weighed. It amounted to *about* twenty-nine grains. (Why is not the exact weight given?) It was then boiled with strong hydrochloric acid, when it dissolved with the characteristic colour of the proteine compounds. Upon testing this solution in the usual manner, *only exceedingly minute traces of arsenic could be detected.*"——*Phar. Journal, Dec.* 1851, p. 266.

I intend to make *all the albuminates*, and to give their analysis to ascertain if they combine atom to atom? The dry albuminate of arsenic or arsenite of albumen should contain in 100 parts 98·93 albumen, and 1·07 arsenious acid.

Your readers will perceive that Mr. Herapath did everything he could with his mortar, pestle, and hot water to prove that no compound was formed. Has he proved it? Certainly not. He only shows, *unknowingly*, that, by long trituration and boiling, portions of "the firm combination of arsenious acid and albumen, are dissolved out." If Mr. Herapath will go over his experiments, he will obtain results like Messrs. Gaskell and Fairrie. No one ever stated that a perfectly insoluble compound was produced. Mr. Danson, says, "Albumen precipitates arsenious acid from its solution, forming with it *a sparingly soluble compound.*" *Sulphate of lime* is insoluble, but by long washing and beating in a mortar, large portions of it may be dissolved; in fact, if enough water is employed, *perfect solution is obtained. Sulphate of lead*, which is well known to be an insoluble salt, disappears when distributed through about 35·000 parts of water. Plate glass is an insoluble compound—Mr. Edwards will not gainsay this.—If he places small fragments of the glass in a filter, and treats it with water, he will not dissolve it. Let him, however, follow his own, and Mr. Herapath's process, by smashing it to atoms in a mortar, and then boiling the impalpable powder, repeatedly, in boiling water, when he will find that traces of it dissolve; and, if he carries on his macerating process for some days, he will be astonished at the enormous quantities, comparatively speaking—of silicate which he will have extracted. There are established rules for the washing of a precipitate; and, if Mr. Edwards had studied Fresenius' work more than he appears to have done, and had treated the albuminous coagulate as he would an aluminous one, *he would not state that only the arsenious acid could be affused away.* I now conclude this subject—a full review has been given *pro* and *con*—Your readers will, I think, agree with me, that when a theory in experimental philosophy, founded on reasoning from established facts, is attempted to be overthrown, it demands not merely broad assertions unsupported by data, but carefully conducted experiments and well-grounded facts. We find the views of Liebig are supported by experiments, by which assertion is not unfrequently rendered powerless and entirely destroyed. Let our present race of chemists remember the following excellent advice of Fresenius, before they rush into print:—"He who is not animated with a sincere devotion to science, and is afraid of encountering labour and difficulties in the pursuit of truth; he who would be satisfied with mere assumption and suppositions, and other guess work, *when the attainment of positive certainty is always at hand*, is just as deficient in the necessary qualifications for

analytical researches, as he who is wanting in theoretical knowledge, or in practical skill. He who cannot himself firmly and fully rely upon the accuracy of his operations and labour—he who cannot *swear* to the correctness of his results, may indeed occupy himself with analysis for his own private amusement and practice, but he ought never to *publish* as correct and *positive* the results of his operations and researches, as they would be greatly detrimental to the interests of science and might be eminently injurious to others." No one who has ever been engaged in analysis can deny, that cases will sometimes happen in which doubts may be entertained as to whether the results of the operation are correct, or even where the operator is positively convinced that the results of his process *cannot* be correct.

Note.—We regret exceedingly that so much personal animosity has arisen in this controversy. It involves an important question, which ought to be decided, as its long continued discussion has a tendency to cast opprobium on the scientific skill and candour of one side of the disputants. In justice to those who differ with Dr. Muspratt and his supporters, we shall be happy to give them an equal opportunity of meeting his statements with their own, so that the chemical public may have both views of the question fully before them.

EDITORS.

ON SODA-PYROPHOSPHATE OF IRON.

THERE cannot be a question that a neutral soluble salt of phosphoric acid and iron has long been a desideratum with the physician for the reasons, as well as others, stated by Mr. Ure*. Our object in calling attention to this salt, is to point out what we conceive to be an error in Mr. Ure's paper; and also to show that another salt extremely eligible for internal administration may be prepared, to which the name soda-pyrophosphate of iron properly belongs. Mr. Ure gives the following directions for the preparation of the solution of the salt he recommends:—

" 32·5 grms. of green sulphate of iron in crystals are to be mixed in a porcelain capsule with 5 grms. of sulphuric acid, 30 grms. of water, and as much nitro-muriatic acid as will suffice to effect the oxydation of the protoxide of iron; the above mixture is to be evaporated to dryness to get rid of the free acid, and then treated with water to the amount of one litre. From 107 to 110 grms. of crystallised pyrophosphate of soda are to be dissolved likewise in a litre of water, of course in a separate vessel; the two solutions are next to be mixed together, and, provided the iron solution has been properly prepared, there will be no precipitate whatever. Each litre of liquid will contain as much iron as 16,5 of the green sulphate."

We need scarcely remark that the solution, thus prepared, to contain only soda-pyrophosphate of iron, must consist of the elements only of that salt, *viz.*, pyrophosphoric acid, peroxide of iron, and soda; whereas, Mr. Ure's solution contains a large amount of sulphuric acid, which was introduced into the liquid in combination with the peroxide of iron. Mr. Ure states this solution is slightly alkaline, which leads us to the

* Pharmaceutical Journal, vol. xi., p. 261.

conclusion that the sulphuric acid exists therein, combined with a portion of the soda, the remainder of which forms a basic salt with the pyrophosphoric acid and the peroxide of iron.

From these considerations we would venture to suggest that Mr. Ure's liquid contains, not, as he imagines, soda-pyrophosphate of iron only, if at all; but sulphate of soda, and a new combination in atomic proportions of pyrophosphate of iron, with excess of pyrophosphate of soda. The following equation is probably an expression of the results produced, when the solutions of the tersulphate of iron and pyrophosphate of soda are mixed in the proportions indicated by Mr. Ure :—

1 equivalent of tersulphate of iron, ...	$= 3\ S\ O_3 +$	$F_2\ O_3$
4 equivalents of pyrophosphate of soda, . . .	$=$	$4\ P\ O_5 +$ $8\ Na\ O$
		$3\ S\ O_3 + 4\ P\ O_5 + F_2\ O_3 + 8\ Na\ O$

Produce—

3 equivalents of sulphate of soda, ...	$= 3\ S\ O_3 +$	$3\ Na\ O$
4 equivalents of a new compound of pyrophosphate of soda and pyrophosphate of iron, . .	$=$	$4\ P\ O_5 + F_2\ O_3 + 5\ Na\ O$
		$3\ S\ O_3 + 4\ P\ O_5 + F_2\ O_3 + 8\ Na\ O$

We now proceed to describe the properties of and the process, for which we are indebted to Fleitman and Henneberg, its discoverers, for the preparation of soda-pyrophosphate of iron. Boil pyrophosphate of ferricoxide with a quantity of pyrophosphate of soda, not sufficient to dissolve the whole of the first salt. Filter, and precipitate the soda-pyrophosphate of iron with alcohol from the filtrate. This salt is colourless and easily soluble, but decomposable by heat. Its formula is $2\ Fe_2\ O_3,\ 3\ P\ O_5 + 2\ (2\ Na\ O,\ P\ O_5) + 7\ Aq.$

It may be observed, that this salt, for medical purposes, like Mr. Ure's preparation, is most readily obtained in solution, by which the chances of decomposition are also avoided, and that it contains a larger quantity of peroxide of iron, as the respective formulæ will show.

If the salt, which we have proposed in the place of Mr. Ure's suggestion, should find favour with the medical prescriber, we have still to thank him for having drawn our attention to this subject.

Pyrophosphate of soda, it may be added, is made by heating to redness the ordinary phosphate of soda. Pyrophosphate of iron is readily to be obtained by the precipitation of a solution of sesquichloride of iron with pyrophosphate of soda, and then filtering the liquid and washing the precipitate, which is pyrophosphate of iron. Care should be taken that the sesquichloride contains no free acid, as, in that case, phosphate of iron would be the result of the decomposition.

ON SCAMMONY.

BY M. GUIBOURT,

Professor of Natural History at the Ecole de Pharmacie, Paris.

It may with truth be stated, that the acquirements, the most indispensable to a pharmaceutist, and the most honourable basis of his fortunes and his reputation, are an intimate knowledge of the Materia Medica, and a great practical acquaintance with the preparation of medicine. A pharmaceutist, who cannot distinguish a good medicinal substance from an inferior or an adulterated one, and who obtains, ready-made, all his medicinal preparations—his extracts—his syrups—his plaisters—his distilled waters—his chemicals—does not deserve the confidence, either of the public, or of the medical profession, and has no reason to complain of the neglect of which he may find himself the victim.

A pharmaceutist ought, especially, to guard himself from throwing discredit on a simple drug, from endeavouring to have it believed that it is difficult to obtain it of good quality, or, that it is so variable in its composition, that medical practitioners can rarely rely on its effects; for, from the discredit of a simple drug to that of its preparation there is but a step, and we have too many drugs already forgotten from which medicine might beneficially derive great aid.

These reflections have been suggested to me by two notes relative to scammony, recently published by M. M. Thorel* and Dublanc†, and will be my excuse for the critical examination I intend to make of their publications; both, in effect, founding their observations on the fact, which I deny, that the scammony from Aleppo varies so much in its nature as to give a difference of from 17 to 96 per cent. of purgative resin, without our being able to distinguish any difference in its physical characteristics; conclude, that scammony in its natural state ought to be banished from the practice of medicine, and that it should be replaced by its resin obtained by means of alcohol.

I believe I can assert, on the contrary, that good Aleppo scammony possesses physical characteristics sufficiently certain to distinguish it from inferior or falsified sorts, so that we may continue to use it, directly, in the preparation of medicines.

I will even add, that it is much easier to distinguish a good scammony from a bad, than it would be to recognise a pure resin of scammony from one which had been adulterated; inasmuch, as from the deplorable state into which the manufacture of medicinal preparations has fallen, a pharmaceutist, who obtains his resin of scammony from the ordinary sources of commerce, is much more likely to be deceived than if he had bought the scammony in its natural state.

According to M. Thorel, there is no doubt that the uncertainty to which the use of scammony is subject, proceeds from the fact of its being used in the state in which commerce presents it to us, without its being possible to appreciate, by mere sight, its purgative value; and the worst sorts being liable to be mistaken for the best, since no exterior characteristic can be relied on for certain, not even the peculiar odour

* M. Thorel, Repertoire de Pharmacie, Février 1851.

† M. Dublanc, Journal de Pharmacie, Mars 1851

of *brioche**, which passes for the best; there would certainly result the neglect of this precious medicine, unless it were employed in the state of extract or resin. By this means, every kind would be brought to the same value. *The resins would be identical from whatever source they were obtained*, and the practitioner, having once decided on the doses to prescribe, would obtain the most happy results.

I may be permitted to say that I do not approve of every part of this conclusion; for if it is often advantageous to substitute for a natural substance—the principle, or the part which is the cause of its chief properties—it is on the condition, that the original substance be first chosen of good quality. We must not think it sufficient, for example, to extract the resin from scammonies of every quality, or from every source, and, especially, we must not regard that as the best, which yields the largest amount of resin solely on that account. We may conceive that nothing could be more easy than to falsify scammony with a common resin.

In the present case, what I blame in M. Thorel, and also in a slight degree M. Dublanc, is, that they rely on insufficient characteristics or content themselves with this reason, which is not less so—that the scammonies examined by them were obtained from the best drug-houses of Lyons and Paris. Indeed, since no drug-house, of however high a standing, would consent to keep only those articles which are of the first quality, it is a duty of the pharmaceutist to choose from their samples the one which presents the marks of the best sort.

Besides, M. Thorel gives the name of Smyrna scammony to inferior kinds of Aleppo scammony more or less falsified; whereas it constitutes a distinct species, which may be found as pure and as resinous as the other, but which does not possess, perhaps, in an equal degree, the purgative property. As to Montpellier scammony, M. Thorel quotes me, for the sole purpose of blaming me for having said that this scammony was made from the juice of the cynanchum Monspeliacum; and he adds, that a traveller from the neighbourhood of Montpellier has affirmed to him, that this cynanchum is quite foreign to that country, and that the fabrication of the scammony is unknown there.

I acknowledge that I have not seen, myself, either the plant, or the manufactured article, but I believe the facts to be true, from the authorities by which they may be supported. These are, first, Lobel and Pena; this latter, a native of Narbonne, gives a description and sketch of a plant under the name of scammonium Monspeliense, which Linnæus has since made his cynanchum Monspeliacum, and he tells us, that this plant is very abundant all along the sandy shores of the Mediterranean, from the mouths of the Rhone to Agde—that the milky juice with which it abounds is employed as a purgative, but in a larger dose than Syrian scammony; and, lastly, that this juice, dried without any addition, is of a black or brown colour.

Then we have again Clusius, who found near Valence, and on the coasts of Languedoc, principally on that part between the sea and the lake of Thau, a convololaceous plant, of the family apocyneæ, which is

* Brioche is a small cake much used in France; it contains caraway seeds, and has an odour very similar to that which is supposed to be characteristic of good scammony.

filled with a milky juice, and which is again the cynanchum Monspeliacum of Linnæus.

Again, Jean Baubin adds to the preceeding details, that with the juice of this plant and common resin, the Marseillaise adulterate scammony with so much skill, that it is difficult to detect it.

I might also cite Magnol and Gonan, both physicians of Montpellier, and celebrated botanists; but what precedes, suffices to show that the cynanchum Monspeliacum is very abundant on the coasts of the Mediterranean, and that its milky juice serves to prepare a kind of scammony, which can be no other than that known under the name of Montpellier scammony.

I have said, besides, that they add to this juice different resins; that its physical characters and its nature are very variable; and that this sort should be completely rejected from the shop of the pharmaceutist.

I have objected to M. Thorel, that he has judged from very insufficient characteristics in the choice he has made of his scammonies, and it appears to me he has given us a proof of my assertion. A scammony which he possessed, and which he would not use *because it gave out no odour*, furnished him, however, with 84 per cent. of resin. He immediately draws the consequence, that the characteristic of the peculiar odour is faulty, and he places this inodorous scammony above all the others; notwithstanding which, the peculiar odour that scammony exhales when it is rubbed or breathed on, is not the only one, but one of the best signs of its good quality, and it is probable that the scammony, so resinous and inodorous, of M. Thorel was not pure. We may naturally conclude the resin obtained was not more pure; then, also, what advantage could arise from its preparation?

We must, always, then fall back on the purity of the original substance, of which we must assure ourselves, by the *reunion of all the characters of which it is possessed;* when it shall have been chosen in this way, we shall find, perhaps, that it constitutes a medicine sufficiently uniform and constant in its effects, to remain amongst those which the medical practitioner and the pharmaceutist may employ.

I admit, however, that there is often an advantage in employing the resin of scammony in a state of purity! why, then, does not M. Thorel give us a better method of obtaining it in that state? Thus our worthy friend blames the codex for having placed the preparation of the resin of scammony under the same formula as that for the resin of jalap, which, he says, containing a great deal of extractive matter soluble in alcohol and in water, obliges us to subtract these matters by means of water, whereas, in employing the best sorts of scammony, which contain very little, the addition of water becomes unnecessary.

Notwithstanding, M. Thorel has before told us that the worst sorts may be mistaken for the best, so that these bad sorts containing more extractive matter, this latter will remain mixed with the resin.

Again, M. Thorel does not advise us to treat the scammony with alcohol at 56° over proof, or even a spirit at 50°, but a spirit of about 40° overproof, because he finds that this gives a larger product than the other, that is to say:—That this spirit dissolves some of the gummy or extractive parts which render the resin more impure, and he prefers the

product by the direct evaporation of the alcoholic solution to the resin of scammony, as prepared according to the codex*.

As to M. Dublanc, he follows the directions of the codex for the preparation of the resin of scammony, and I have no other objection to make to his communication, besides that of being too absolute in substituting in every case the resin of scammony, for the scammony in its natural state, grounding his proposition on the objection that, either the finest scammonies of commerce offer characteristics which are seldom alike, or that the finest scammony offering the most favourable characteristics, may contain only 17 per cent. of resin, while others, similar in appearance, furnish 20, 22, 27, 28, 36, 50, 64, and 96 per cent. of resin. If these facts are exact, it is certain that scammony is the least to be relied on of all the medicines; but are they certain? Indeed! if scammonies, considered as the finest in commerce, offer characteristics so dissimilar, is it not rather in reality because they are of different qualities?

Reciprocally, if these scammonies differ so much as to contain from 17 to 96 per cent. of resin, were they so well marked with the characteristic physical properties, that there were no means of distinguishing them from each other? This is what we may be permitted to doubt.

I may be allowed to make some further observations on the letter of M. Dublanc. It is not our colleague who first made known the fact that scammony contains a small quantity of gum, and the frequent presence of starch in the commercial article; besides, he exaggerates the value of these two facts, when he states as a principle, that the gum is not a constituent part of the elements of scammony; but that what does constitute it, independently of the resin, is starch.

Starch, although contained abundantly in the root, does not make a part of the milky juice which constitutes scammony, and is only found there, when, instead of extracting the milky juice by incisions, the roots are pounded, and the juice obtained by pressure, and dried either in the sun, or over the fire. It is certain, in fact, that the fine sorts of Aleppo scammony contain but a small quantity of starch, and that, accidentally, whilst the inferior sorts obtained by expression and to be rejected by the pharmaceutist, contain 15, 17, and even 36 per cent. It is also certain, that what constitutes scammony in the plant in the state of a milky juice, and which gives it the property of reconstituting a milky and viscous juice by means of water, or the saliva, cannot be starch; but the gummy and extractive particles that it contains, which form an essential part of it, and which, notwithstanding its small quantity, is a sufficient motive to give scammony a place amongst the products, classed under the common name of gum resins.

In conclusion, M. Guibourt presented to the society a salt, which he had formerly obtained in analysing some Aleppo scammony, but which he had not had time to examine or reproduce. "I remarked," he observed, "contrary to the observation of Bouillon, Lagrange, and of M. Vogel, that the product from the washings of resin of scammony with water, reddened litmus rather strongly."—*Journal de Pharmacie.*

* The French codex orders the resin to be precipitated from the alcoholic solution by the addition of water, to separate the gummy and extractive matters.

AN ADDRESS TO OUR READERS.

A DESIRE, more or less expressed, has long been felt by the pharmaceutists of this country, both those within and those without the pale of the Pharmaceutical Society, to see a journal established, which should convey to its readers the earliest intelligence of all important discoveries and improvements on subjects connected with their profession; and at the same time to be an impartial medium of communication on all matters referring to their educational progress, their legal and social status, and on various other questions affecting their present well-being, and their future advancement.

It is quite evident, that no journal can accomplish these important objects which is avowedly the organ of a small section of the pharmaceutical body, whose sole purpose it is to carry out certain designs and notions, regardless of the opinions and interests of a large but unrepresented majority of that body. Such a journal will suppress all facts and comments which militate against the views of its promoters, and, consequently, its readers will become indoctrinated with ideas conceived through the coloured media of prejudice and self-interest, and be deceived by arguments and conclusions based on false or partial data.

Having for years painfully experienced the truth of the above statements ourselves, in common with hundreds of our brethren, we resolved to establish an independent journal, which shall represent the wishes and wants of all those who are at present without a medium of publicly expressing their views and feelings.

With what degree of success we shall attain this enviable position, we shall leave the future to decide. Sufficient to say, that no labour or expense will be spared to render our journal worthy of the patronage of that class of the community whom it is especially designed to benefit.

We have made arrangements for receiving and publishing the earliest information, both British and Foreign, upon all subjects, whether of a scientific or a practical nature, connected with the profession of pharmacy.

Not being under the control of either publishers or authors, we shall give, from time to time, at least disinterested critical notices of books, so that the pharmaceutical community may gather, from our pages, opinions of the current scientific literature, bearing on their avocation.

To prevent any misunderstanding respecting our views and intentions with regard to the Pharmaceutical Society, we wish distinctly to state, that, although we do not look upon it as the perfection of human wisdom,

as some represent it to be; yet we yield to nobody in a greater anxiety to maintain it in all its usefulness, believing, that some such rallying point to pharmaceutical chemists is necessary for their educational progress and social advancement.

Our wishes are, that, by pointing out its defects, by endeavouring to remedy its worst features and making it suitable for the constantly progressing requirements of the age, it may become a greater boon to our brethren and take a deeper root in their estimation. Therefore, we counsel all who have seceded from it, because it has not realised to them the promised and expected benefits, to gather round it, and whilst supporting it right earnestly with equal energy, to assist in the work of its reformation. The Society requires their help, and by that help it may be rendered an acceptable institution to the whole pharmaceutical community.

Finally, we wish it to be clearly understood, that this journal being designed expressedly for pharmaceutical chemists, the Editors will scrupulously abstain from meddling with any subjects connected with medical science and polity, as being matters beyond their province and better left in the more able hands of those periodicals devoted to such topics. Should, however, the medical profession and the pure chemist find aught to interest them in this journal, great will be our gratification.

PUBLICATION OF LECTURES DELIVERED AT THE PHARMACEUTICAL SOCIETY.

Innumerable have been the complaints made by the Members and Associates of the Pharmaceutical Society, that the expensive courses of lectures which have been paid for by their subscriptions, have not been published in the Society's transactions; so that those who live at a distance, or are unable to leave their homes to attend at the Society's house, might derive an equal benefit to those placed in a more favourable position.

The former constitute, unfortunately, a very large majority of the members and associates whose wishes in this respect have not received the consideration which they deserve.

We have been led to these remarks by an attempt that has been recently made to cast odium upon those members of the Society who contend for the publication of the lectures. They have been denounced as abettors of piratical and dishonest proceedings by persons who, like the dog in the manger, would not publish the lectures themselves, or allow anybody else to do so if they could prevent it.

Unhappily, at present, for the diffiusion of knowledge, those who have the desire to suppress the publication of these lectures, have also the power; and still moreover to be deplored, they have availed themselves of the opportunity which the discussion on this subject presented, of heaping calumny on the heads of those men, whose only crime was that, having disinterested opinions of their own, they had manliness to express them.

Those who have been thus denounced, may receive the consolation that, sooner or later, malevolence and detraction prompted by jealousy, however disguised, will be unmasked, and recoil upon those that cherish it.

Let it not be supposed that we are advocates of literary piracy under any pretence, far from it. All that we ask is to be convinced, that the publication of lectures, without the consent of the lecturer, is morally or legally a crime.

We are not compelled to take any person's *ipse dixit*, however competent and disinterested as an established law, or a code of morality. If it were a legal wrong, which we do not believe, it admits of a legal remedy; therefore, we say, stigmatise not those persons who believe they are legally right in their opinions as abettors of piracy and dishonesty, until the proper tribunals have decided that the publication of these lectures is piratical and dishonest.

Morally wrong it cannot be to publish the lectures of any individual who is paid a certain stipend for the course, whether ten or ten thousand persons are numbered amongst his auditors. If a lecturer derived a fee for every member added to his class, it would be a manifest injustice to him to permit others than those thus paying to participate in the result of his labours; but the lecturers at the Pharmaceutical Society are not in this position, consequently, cannot claim the moral right to have their lectures circumscribed, in regard to the number who are willing to avail themselves of their instruction, whether as readers or as auditors.

We purposely abstain from making personal allusions in reference to this matter, because we are contending for a principle which, we believe, will ultimately be pronounced just, and will prevail. Moreover, when those who hold, or pretend to hold, contrary opinions, resort to calumnious imputations on the characters of their opponents, and to every other unbecoming device that ingenuity can invent to carry their object; the conviction must necessarily arise, to all impartial spectators, that neither truth, nor justice, nor gentlemanly feeling, is on the side of those thus acting.

Reviews.

Translation of the Pharmacopœia of the Royal College of Physicians of London, 1851: *With Notes and Illustrations, by* Richard Phillips, F.R.S.L. & E., F.G.S., &c. &c. London: Highley and Son, 32, Fleet Street.

Few persons in our time have been so eminently qualified to edite or translate a pharmacopœia, as the late Richard Phillips. He commenced his career as a pharmaceutical chemist, which gave him an excellent opportunity of becoming practically acquainted with all the processes and manipulations necessary to prepare, in the most advantageous manner, the remedial agents prescribed by the physician. In later life, he enjoyed an European reputation as a skilful and accurate analytical chemist.

With qualities so necessary and valuable for any person to possess, who assumes the responsible duty of constructing a pharmacopœia, it does not detract from the high reputation that the College of Physicians enjoys for the learning and scientific acquirements of its members, to say that Mr. Phillips was for years consulted by them in the compilation of their pharmacopœia.

Bearing in mind these facts, it must follow, almost as a necessary consequence, that his translation of the pharmacopœia will occupy the highest position for its faithfulness as an English version of the original, and for the rigid accuracy and the extensive information of its notes and illustrations.

With reference to this posthumous edition, it may be said, that Mr. Smith, the friend and former pupil of the late Richard Phillips, has fulfilled his task as its editor, upon the demise of Mr. Phillips, with something akin to filial piety. He seems to have spared no pains to render it worthy of the name it has for so many years acquired; and we feel no hesitation in expressing our opinion, that his success has been equal to his manifest desire.

After what we stated with reference to the careful and able manner in which this work has been executed, it will not excite surprise that there is little room left for finding fault; but, nevertheless, one or two points there are which involve inaccuracy, and therefore demand our attention.

It is stated, when speaking of potassiotartrate of iron in the pharmacopœia, that this salt contains 34 per cent. of peroxide of iron. Mr. Phillips says, in his notes on this preparation, that this estimate of the quantity of peroxide is probably too high, in which surmise he is no doubt correct, and, consequently, he regards the formula of Soubeiran as representing the correct composition of this salt, *viz.*:

One equivalent of tartrate of potash, ...	66 + 48 = 114
One equivalent of ditartrate of sesquioxide of iron,	66 + 80 = 146
	260

He then observes, " If, however, this salt contains 34 grains of pure sesquioxide of iron, combined with the excess of tartaric acid in the bitartrate of potash, the above formula cannot represent its composition; in this case, it would seem to consist of an equivalent of tartrate of potash, combined with an equivalent of tristartrate of the sesquioxide of iron (3 Fe^2 O^3, 2 C^4 H^2 O^5), and six equivalents of water."

Let us examine this statement to ascertain whether a salt of the above constitution could contain 34 per cent. of sesquioxide of iron.

One equivalent of tartrate of potash, ...	= 114
One equivalent of tristartrate of the sesquioxide of iron, composed of three equivalents of sesquioxide of iron, and two equivalents of tartaric acid, ...	= 372
Six equivalents of water, ...	= 54
Equivalent of potassiotartrate of iron, . . .	= 540

It follows, from this table, that 540 parts of such a salt would contain 240 parts, or three equivalents of the sesquioxide of iron, which is equal to 44.4 per cent., instead of 34, as the editor represents. Upon what assumptions or data the editor or translator arrives at the conclusion that the potassiotartrate of iron has the extraordinary composition described in the above table, except on the erroneous assumption that it contains 34 per cent. of the peroxide of iron, we are at a loss to divine; and we are also equally puzzled to guess by what evidence he concludes that it contains six equivalents of water, as, from our own experience, as well as that of others, this salt, when carefully prepared, is anhydrous.

We regret that the translator does not appear to have reconsidered his view of the chemical composition of liquor potassæ arsenitis, especially as it is at variance with the researches of Soubeiran, which researches have been lately confirmed by Mr. Bullock. The pharmacopœia directs that only sufficient heat should be applied to dissolve the arsenious acid in the solution of carbonate of potash. It is affirmed, with every appearance of truth, that this amount of heat does not effect the decomposition of the carbonate potash, and the union of its base with the arsenious acid; whereas, Mr. Phillips still maintains, in this edition, that a complete change does take place, ending with the combination of the whole of the arsenious acid employed with the potash, and the expulsion of its previously combined carbonic acid so as to form arsenite of potash.

We do not notice these matters to detract from the sterling merits of this translation, but merely that the editor may give them his attention, so that the objections urged may be explained in a second edition, which we have no doubt, judging from the success of its predecessors, it will speedily arrive at.

A Compendium of Materia Medica and Pharmacy: *adapted to the London Pharmacopœia; embodying the new French, American, and Indian medicines; a Summary of Practical Toxicology, with the Abbreviations used in Prescriptions.* By J. Hunter Lane, M.D., F.L.S., &c. London: John Churchill. 1851. Second edition.

This little work is a veritable *multum in parvo*, and is a striking evidence of what can be accomplished by a terse and condensed style in compressing a large amount of information into a proportionately small space of letter-press. The author appears to have assiduously and successfully sought for information on all new medicines and preparations, and has placed the results of his inquiries before his readers clearly and succinctly in this compendium. The summary of practical toxicology contains a useful guide for the pharmaceutist as to the course to be pursued in those urgent cases of poisoning, frequently forced upon his attention, where increased danger to life must necessarily ensue, either by doing nothing, or, what is worse, administering improper antidotes, until the services of the qualified practitioner can be obtained.

We would suggest to the author, that he would enhance the value of his book by embodying the formulæ of the Edinburgh and Dublin pharmacopœias in a future edition. As an useful companion to the dispensing counter, we can confidently recommend this volume to our brethren as a work of reference, for which its size and the arrangement of its contents, especially adapt it.

The New London Pharmacopœia: *translated and arranged in a tabular form, with the Edinburgh and Dublin Pharmacopœias, showing at one view the differences in the formulæ of the three Colleges, together with the tests given by each College for the purity of the several preparations; with practical remarks.* By Peter Squire, M.R.S., &c. &c. London: John Churchill, Princes Street, Soho. 1851.

By the typographical arrangements of this work, the differences in the formulæ of the respective colleges are brought out into bold relief. Every person, whether prescriber, pharmaceutist, or patient, who has been inconvenienced, to use a mild phrase, by the discrepancies arising from there being three pharmacopœial authorities in one country, is greatly indebted to Mr. Squire for the task he has so successfully performed, in bringing this subject prominently forward. In fact, there seems to be but one opinion in reference to the necessity of a uniformity of the pharmacopœial formulæ being adapted for this tripartite kingdom.

We would venture to suggest to the authorities, that, if an arrangement cannot be made to publish but one pharmacopœia for Her Majesty's dominions, there might, nevertheless, be, by the co-operation of each college, an identity of formulæ established for those preparations which are common to each pharmacopœia. This plan would

remedy the evils complained of, without trammelling the colleges in any other matters.

Mr. Squire has taken especial pains to defend the formulæ for tinctura quinæ composita contained in the London pharmacopœia from the comments that have been made upon it, for he notices the subject both in the preface and in the body of this work. The objection urged against this formula was, that the disulphate of quinine was, to a great extent, insoluble in the quantity of tincture of orange peel ordered. Mr. Squire meets this statement by relating an experiment he made, wherein he found that only one-fortieth of the quinine salt remained undissolved. We do not doubt for a moment the accuracy of his result; but, nevertheless, we doubt the inference he draws from it; for we believe that orange peel is so constantly contaminated with the juice of the fruit, containing free citric acid, that the tincture made from it will, in consequence, dissolve the quinine almost entirely. Whereas, when the tincture is made from orange peel, carefully pared from the fruit, which has not been previously squeezed, as is usually the practice to obtain the juice, it will not dissolve more than a moiety of the quinine salt directed to be employed.

Mr. Walter Hemingway, who corroborates Mr. Squire's statement, also offers the above suggestion with reference to the varied solvent power of the menstruum.

Had our author considerably extended his practical remarks, we believe his book and its readers would have been thereby much benefited. In fact, in some instances, short as his notes are, he has sacrificed perspicuity to conciseness. For example, when writing on the tests for nitrate of silver, he says,—"The chloride of sodium, or muriate of ammonia, detects nitrate of potash and other salts that the nitrate of silver may be contaminated with." Now, we are satisfied that Mr. Squire understands chemistry too well to mean what he has written. We need not inform him that the above salts of sodium and ammonia will not detect nitrate of potash or any other salt in nitrate of silver, but merely indicate whether the specimen under examination be contaminated or not with anything; in fine, they will not show the nature of the contamination.

We were also going to quarrel with some words in the note on the article "Chloroform;" but we suspect, although it is not so stated, that they are merely a translation of the pharmacopœia, and, moreover, if so, Mr. Phillips has rendered them, in his translation, equally obscure. Speaking of chloroform, the words are,—"It is not quite perfectly soluble in water." We believe that the words, "It is very slightly soluble in water," would have been more intelligible and consistent with the merits of the case.

Mr. Squire suggests that "the London College have probably introduced" liquor sodæ "for making hard soap;" whereas, we think he would have found a more reasonable object for its introduction, had he referred to the formula for preparing antimonii oxysulphuretum.

We entirely coincide with what the author says about making infusions by suspending the materials to be acted on by the water. Dr. Burton has shown the great advantage of this plan in preparing

tinctures, which we regret Mr. Squire has not noticed, as it is worthy of all attention and trial by the pharmaceutist.

In conclusion, we can recommend Mr. Squire's book for use in the dispensary as a work of reference in the preparation of the various compounds of the three pharmacopœias. It is printed in an excellent bold type, for which we have a decided partiality; moreover, most pharmacopœial works either treat of only one, or, when treating of the three pharmacopœias, are so overloaded with matters of detail and dissertations extraneous for the purposes of the dispenser, that the formulæ are oftentimes with difficulty found, and, when found, are so jumbled together, as to endanger accuracy, and retard despatch in dispensing. In this work, the formulæ of each pharmacopœia are printed separately in three distinct and contiguous columns, which renders them very accessible for reference and comparison.

The Chemical Directory and Pharmaceutist's Compendium: *being a Hand-book for Chemists and Druggists, &c. &c.* London: Printed and published by Charles Wright and Co., Albion Buildings, Bartholomew Close. 1851.

Never was there such an incongruous mixture offered to the notice of the pharmaceutist, as is contained in this book. It professes to be a "complete counter companion;" but we fear its completeness terminates with its professions. The directory portion, which is the only novelty of this book, is very far from containing a perfect list of either the metropolitan or the provincial chemists. The names of our brethren in many towns are entirely omitted, and in others they are only imperfectly noticed.

The wholesale price list contained in it must necessarily be worthless, from the constantly fluctuating price of drugs, &c.; and its blank retail price list is badly arranged, by reason of the lines on the blank pages not being perfectly continuous with the names and lines on the printed pages.

The publishers promise to do better in future; but we think, from the specimen of their ability and industry now before us, the pharmaceutical body will not be tempted to give them the chance.

The directory has been published by subscription, which perhaps accounts for the meagreness of its character, both as regards its type, its paper, and its information; and seems to us as though the publishers had striven to make the least possible return to the subscribers for their money, except in the way of advertisements, of which there is a profusion scattered in different parts of its contents.

PHARMACEUTICAL SOCIETY.

We have much gratification in stating that the library of this Society has been increased with a view to render it more perfect, and that arrangements are nearly completed for the purpose of circulating a suitable portion of it amongst the members.

ON CHLOROFORM.

BY WILLIAM HUSKISSON, JUN.

A process appeared some time since, by Dr. Gregory, on the purification of chloroform by means of sulphuric acid; a short time after its publication, an article was added by Professor Christison, (*in the absence of Dr. Gregory,*) stating that chloroform, purified by sulphuric acid, had speedily undergone decomposition,—had become loaded with chlorine, and thus rendered quite unfit for use,—and that the manufacturer had failed, in almost every instance, in obtaining a permanent article. Since that period, no process for the preparation or the purification of chloroform has been published, except in the pharmacopœia; it has been left entirely to the discretion of the manufacturer. Recently, at a meeting of the Pharmaceutical Society, Dr. Pereira exhibited a specimen of chloroform, which had not only undergone change, but had become of a pink colour.

Having prepared chloroform on a large scale, and having had considerable experience in the changes it undergoes, when purified by sulphuric acid, the following is the only process, by which I have always obtained a permanent article; and one which I have never found, under any circumstances, undergo change or decomposition. I take 130 lbs. of chloride of lime and 7 lbs. of common lime, put them into a capacious still, with sufficient water to make a thin paste; when well stirred together, I then add more water with 25 lbs. of rectified spirit, (*taking care that the still shall not be more than half full,*) lute it down; load it; apply a gentle heat, and commence distillation; separate what comes over from the supernatant liquor, and wash it several times with distilled water: *put the washings and supernatant liquor again into the still, with one-half the above quantities, and proceed as before;* then introduce the chloroform thus obtained into an ordinary still, with four or five times its weight of distilled water, with a small quantity of lime; apply heat, and let the chloroform bubble through the water, and pass over; separate the chloroform from the water that comes over with it, by means of a separatory funnel, and agitate it with a little highly dried carbonate of potash, to entirely abstract from it a small portion of water it generally contains.

With regard to the product, there is considerable uncertainty, owing to the great difference in the quality of the chloride of lime employed; it is necessary that the chloride should be rendered alkaline by means of lime, otherwise formic acid is not so readily produced,—it also prevents, in a great measure, the action being so violent when the ingredients are mixed; and the chloroform that passes over is rarely contaminated with chlorine, which is frequently the case when the lime is omitted. I have occasionally added a weak solution of chlorine instead of water, and a larger quantity of lime; but neither by this, nor by any of the other processes I have tried, have I obtained a result so uniform or satisfactory, as by the foregoing. The chloroform, when thus carefully prepared, answers to the following tests:—It is exceedingly bright and transparent in any moderate temperature, possessing a highly penetrating aromatic odour; when dropped upon the hand it rapidly evaporates, leaving no faint unpleasant

odour behind. It is not affected by litmus or turmeric paper; when dropped into water the greater part immediately sinks, leaving a little floating on the surface, which after a time sinks also, imparting a sweetish taste to the water. It has a specific gravity of 1,500, which is the best test of its strength; when agitated with sulphuric acid, the acid becomes coloured yellow, the chloroform loses its fine odour and undergoes decomposition, which takes place still more rapidly if allowed to remain in contact with the acid, giving off a gas somewhat resembling hydrochloric. If it contains the smallest amount of alcohol or spirits of wine, on the addition of a little bichromate of potash, and a few drops of sulphuric acid, the green oxide of chromium is formed which floats on the surface, and, if allowed to evaporate spontaneously, the aldehyd which is formed thereby can be easily recognised. It is miscible with alcohol; if rather more than 13 parts of chloroform and 6 parts of alcohol, (,835 S. G.,) be mixed, they will unite and give a specific gravity of about 1,200, and if more chloroform be added they will separate. When it contains the smallest amount of water, it will become clouded with every variation of temperature.

It is quite evident that the carbonising or charring of the volatile oil by concentrated sulphuric acid, which is said to have caused nausea, &c. in peculiar sensitive persons (*even when agitated with the purest sulphuric acid*), has caused decomposition of the chloroform as well as of the oil. It occurred to me, that the sulphuric acid converted the chloroform into formic acid by affording it sufficient oxygen, and the free chlorine combined with hydrogen, thus forming hydrochloric gas. When chloroform has been treated with sulphuric acid, it is usually agitated with oxide of manganese, which decomposes any free sulphurous acid that might be present.

Another remarkable phenomena in decomposed chloroform, is the formation of a number of crystals round the upper surface of the chloroform, and after the lapse of a few weeks, its becoming a delicate pink colour, which is sometimes fugitive, owing, no doubt, to a salt of manganese, most probably a sulphate, and this opinion is strengthened by the fact of its being observable in the following preparations:—

When acetic acid is obtained by decomposing acetate of soda by sulphuric acid, the sulphurous acid that is formed passes over with the acetic acid; to remove this mineral acid, it was usual to add oxide of manganese; after a short time, the acetic acid that has been thus deprived of its sulphurous acid will frequently become pink, and deposit pink crystals; also in the preparation of chlorate of potash, if the heat applied to the mixture be too great, and the mixture boils over, the mother liquors will frequently be of a rich pink colour. From these results I think we may safely infer, that it is a salt of manganese like the mineral chameleon, which gives rise to the formation of crystals in, and to the changing colour of chloroform, when subjected to Dr. Gregory's process.

I have tested and examined large quantities of Edinburgh and Dublin chloroform, but have never met with any to supersede, or even equal in its general characters, that prepared from the spirit obtained from the best London distillers; I regret that many scientific journals

should have stated that the Edinburgh manufacturers have devoted more care and attention to its preparation, and have produced the best chloroform. The fact was, while the London manufacturers were exerting every effort to cover the actual expenses of materials, &c. to say nothing of profit, owing to the the great difference in the duty on spirit or whisky in England, and Scotland, and Ireland, (*chloroform is admitted free of duty into England;*) they, in the latter countries, manufactured at a profit, and we at a loss; and the result was, after repeated attempts, the London makers were compelled to give way to their Scotch friends, though not in quality, but in price.

ON THE MICROSCOPE AS A MEANS OF DETECTING THE ADMIXTURE OR ADULTERATION OF DRUGS.

"You are doubtless conversant with the recent very extensive employment of the microscope for disclosing the adulteration of food. No less useful—no less powerful—is it in disclosing the contamination of drugs; and I cannot too strenuously recommend you to employ it." Such was the language used by Dr. Pereira, in his introductory lecture on Materia Medica, delivered this year at the Pharmaceutical Society.

Many persons of no mean skill in chemistry, smiled incredulously at the results obtained, when they ascertained that the principal instrument employed by Dr. Hassal, the *Lancet* commissioner, in detecting the adulteration of substances used as food, was the microscope. We confess that we entertained considerable doubt as to the accuracy of the extraordinary revelations that he gave confidently to the public, in the pages of the *Lancet*. Every person conversant with chemistry, was well aware what a useful adjunct the microscope has been to the chemical analyst in distinguishing the form of minute crystals, and thereby determining their true character when mixed with organic or inorganic bodies; but few foresaw that it might be employed as a means of analysis itself in mixtures of organised substances.

In fact, in physiologal chemistry, the microscope is preferred to every other resource as a means to detect the presence of minute quantities of organic crystalline compounds in the complex fluids secreted by animals.

Dr. C. G. Lehmann, a very high authority, observes, when speaking of the tests for detection of urea, that the best method to ascertain its presence, is by the formation of its salts with nitric and oxalic acids, and to submit the salts so formed, when crystallised by the evaporation of their menstruum, to microscopic examination, and thus to ascertain the correct shape of the crystals, "which, if the investigation is to be unquestionable, the acute angles must be always measured;" for, as he farther remarks, that "a good crystallometric determination yields the same certainty as an elementary analysis, which, in these cases, would never or extremely seldom be possible*." These evidences of the value of the microscope as a means of testing by the physical charac-

* Lehmann's Physiological Chemistry, vol. i., pp. 159 and 160.

teristics of a crystalline substance, might be multiplied almost innumerably from the same and other authorities.

However extraordinary the statement may appear, that Dr. Lehmann and others prefer the microscope as the agent by which the composition or some of the ingredients of a complex body are to be determined when those ingredients are crystalline, the results of the investigations of Drs. Hassal and Pereira, and Mr. Quekett are yet more remarkable and worthy of attention, for they prove that the microscope is the only, or at least the only good means which science has at present discovered to detect the admixture or adulteration of non-crystalline organic substances.

Dr. Pereira first impressed on the attention of pharmaceutists the value of this instrument for discriminating between the numerous varieties of starch which are offered to the public for domestic purposes under an equal variety of names; but it remained for Dr. Hassal to show its unlimited valuable applications.

The conclusions that may be drawn from the *Lancet* commissioner's laborious researches are, that the solid portions of all organised structures present to the eye, when aided by the microscope, such distinguishing characteristics, that, by an experienced observer, they can be referred to their respective origins; and that when even these portions are in a state of minute subdivision, the form of the cells, the shape of the starch granules and the condition of the spiral vessels, and other indications, afford an equally accurate result.

To assert that Dr. Hassal has never arrived at an erroneous conclusion in his investigations, would be to ascribe to him something more than human; but to state that his results are surprisingly accurate would be within the limits of truth, to which statement even the victims, as no doubt they consider themselves, of his indefatigable and ruthless microscopic skill, have repeatedly borne testimony.

As this paper is written for the student, and not for the initiated in these matters, we shall here briefly indicate the method by which skill, when aided by perseverance, may be acquired in detecting the adulteration of drugs by microscopical observation. It is unnecessary to describe the construction of the microscope, as it is an instrument that most persons are familiar with, and a description of it may be found in many standard works; but it may be observed that the instrument necessary for this purpose should possess a magnifying power from 200 to 400 diameters.

We shall assume, to illustrate the method, that a sample of suspected powdered rhubarb has been taken for examination; but before the investigator can pronounce an opinion, or form a judgment of the suspected sample, it is necessary that he should be well acquainted with the characteristics of powdered rhubarb of authenticated genuineness, which he can readily prepare for himself.

It is by a comparative examination of the genuine and the adulterated article under the microscope, that the presence of foreign substances in the adulterated powder can be distinguished, because, as previously stated, the form of the starch granules, the shape of the cells of each organic substance, have a character peculiar to themselves, by which their source may be determined.

By a similar process, the question can be answered, when it is thus ascertained that a drug has been unadulterated,—by what substance or substances has this drug been contaminated?

The investigator will know, from previous experience, those materials which are most suitable for the sophistication of the genuine article, and by rendering himself familiar with their appearances in a pulverised state, when viewed by the microscope, he will readily detect their presence in the adulterated powder, and be able to refer them to their origin. But in this instance, and all others, he must learn the microscopical characteristics of any substance, whose detection is desirable, from specimens, the genuineness of which he can vouch for.

To avoid a constant repetition of the examination of every substance, whose microscopical characteristics it may be desirable to be acquainted with, and which are difficult to commit to memory, it will be advisable, for the purpose of reference, to obtain drawings of them, which is most readily and perfectly accomplished by the aid of the camera lucida.

Moreover, it should be borne in mind, that the microscope can never supplant chemical analysis in detecting the admixture or adulteration of such drugs as opium, scammony, and others, which are the concrete juices or exudations of plants; but for the powders of barks, roots, leaves, and such organised substances as consist of cellular tissue, ligneous fibre, &c., it is in the highest degree superior to every other known or available means for the discovery of their sophistication.

In conclusion, it may be remarked that, although investigations by the aid of the microscope require less time for their performance, and certainly not greater ability for the acquirement of the necessary skill than chemical analysis, yet no one can expect to be *au fait* in the application of this instrument for the purposes described, except by the devotion of much time and attention to its study.

ON THE PREPARATION OF CHLOROFORM BY THE USE OF OIL OF TURPENTINE.

BY M. CHAUTARD,

Professor of Chemistry at the Lyceum of Vendôme.

On intimately mixing in a retort 600 parts of water, 200 parts of chloride of lime, with twenty-five parts of oil of turpentine, and submitting the whole to distillation, a very violent reaction ensues, accompanied with the disengagement of a somewhat agreeable odour. A large quantity of carbonic acid gas is at the same time evolved, which, by causing the contents of the retort to froth up very much, renders it necessary to employ a distillatory apparatus of ample capacity. The heat must be removed as soon as this frothing up commences, when the operation proceeds spontaneously until the whole of the chloroform has passed over.

Three distinct strata of liquids will be found in the recipient;—the lightest is a portion of oil of turpentine which has escaped decomposition;—the heaviest portion is an ethereal liquid, in all respects similar to chloroform;—whilst the intermediary layer is water, containing, in solution, a quantity of chloroform. The dense liquid is then

separated, by means of a pipette, from the other two strata, and rectified in a water-bath. Two or three treatments with chloride of calcium serve to give a perfectly pure chloroform.

The product thus obtained, presents entirely the same characteristics as the chloroform of the methylic series, and its composition is the same. It is a perfectly colourless liquid, very mobile, of a very sweet taste and agreeable odour, heavier than water, in which it is, to a certain extent, soluble, imparting to it the two properties just mentioned. Its boiling point is 63° C. Submitted to analysis, this substance gave the following composition :—

C = 10,47 H = 1,03 Cl = 88,59

Theory would give—

C = 10,05 H = 0,04 Cl = 89,11

M. Chautard attributes the slight excess of carbon and hydrogen obtained, to a small quantity of carburetted hydrogen, which obstinately accompanies the chloroform, and which might, in all probability, be removed by means of sulphuric acid.

This remark also applies to the few degrees of difference between the boiling point of this substance, and that generally admitted for chloroform. M. Chautard states, that he has no doubt that, by carefully modifying the process above described, he will be able to obtain chloroform in a manner sufficiently economical to be substituted for that at present employed.

ON A NEW COMBINATION OF MERCURY.

BY MESSRS. SOBRERO AND SELEMI.

If we make a solution of bichloride of mercury in alcohol, and precipitate the oxide from it by means of an alcoholic solution of potash, so as to render the liquor strongly alkaline, we obtain a yellow precipitate which is not the oxide of mercury, but a combination of mercury with the three elements, carbon, hydrogen, and oxygen. This precipitate is amorphous and insoluble in water and alcohol, it should be washed, to free it from any excess of potash and chloride of potassium.

In the preparation of this body, it is well to operate at a temperature of about 100° F. This compound is stable at the ordinary temperature ; and although we have not determined exactly the temperature at which it is decomposed, it would not appear to be far from 390° Fahr. : heated to a higher degree than this it assumes a slight orange tint, and is then suddenly decomposed with a violent detonation into gaseous products, leaving no residue. In order to obtain this detonating property, it is necessary to observe the condition above-mentioned. If we make the precipitate from cold solutions, or do not employ a sufficient quantity of potash, we obtain a product less detonating, and which leaves a residue of oxide of mercury. Exposed to the light, this substance blackens readily. If we heat it in a tube whilst still moist, it decomposes less violently, and metallic mercury, water, and acetic acid, are the results.

It is completely dissolved in hydrochloric acid without heat, and yields a volatile substance of a pungent irritating odour, quite peculiar, which

produces a sensation in the throat similar to that produced by Prussic acid. On distilling this mixture we obtain the volatile substance mixed with hydrochloric acid. On adding nitrate of silver to the product, we obtain with the precipitate of chloride of silver a soluble compound which crystallizes in beautiful transparent crystals. Sulphuric acid dissolves the mercurial compound we are speaking of, and forms crystalline compounds. Nitric acid also dissolves it: the nitric solution gives with caustic potash, a grey precipitate which, treated with hydrochloric acid, yields a volatile subtance having the same odour as that furnished by the original substance already described. Acetic acid dissolves almost completely the same substance, and yields by evaporation a crystalline body.

Boiled with a solution of hydrochlorate of ammonia, the ammonia is set free, and a soluble crystalline substance is formed. We also obtain a crystalline compound when it is boiled with bichloride of mercury. Although we have not yet determined the exact composition of this singular body, yet we may be satisfied that it contains mercury, oxygen, carbon, and hydrogen; that these latter elements are not in the same proportion as in alcohol, but that there is a less amount of hydrogen, that it behaves as a strong base, and unites with sulphuric, nitric, acetic, and several other acids is evident.

In our researches, by varying the re-actions in different ways, we have obtained compounds of mercury, which might be classed with the substance above described. We obtain, for example, a different body from that, by adding a weak solution of potash, to a boiling solution of bichloride of mercury.

If we dissolve mercury in nitric acid, and drive off all the nitrous products by ebullition, and mix this solution with alcohol, in the same proportion as for the preparation of fulminating mercury, we have no immediate reaction so long as the mixture is kept under 212° F.; but when the temperature is raised to 212° F. we see immediately formed a white crystalline compound, the formation of which is not suspended even when the temperature is reduced. This reaction is not accompanied by any disengagement of gas. The precipitate contains oxide of mercury, nitric acid, carbon, and hydrogen; treated with hydrochloric acid, it yields a volatile substance, having the peculiar odour already described. We may expect by similar reactions to those described above, to obtain analogous compounds by substituting amylic or mythelic spirit for the ordinary alcohol, and, by substituting other metals, such as silver for the mercury.——*Repertoire de Pharmacie.*

ON THE PREPARATION OF COLLODION.

M. Viel prepares collodion by using gun cotton, which has been a second time immersed, after having been previously well washed in water, in the mixture of sulphuric acid and nitrate of potash. He then washes it again in water, and subsequently in alcohol. When dryed by pressing it between layers of linen, he immediately dissolves it in ether.

Cotton thus prepared, he states, is much more adhesive than that made in the ordinary manner, which is oftentimes devoid of any such property.

DOLLESCHALE's INSECTEN TINCTUR.

We had our attention lately directed to the above preparation, which was exhibited in the Austrian department of the Great Exhibition. It is said to be used largely in the hospitals of Vienna, for the purpose of destroying bugs and their eggs. It is protected by the Imperial privilege, which prevents its being pirated, in a similar manner as the patent laws do in England.

Being recommended by strong testimonials curiosity led us to examine it, when we found it to be an etherial solution of camphor. The proprietor cautions those who use it against introducing a lighted candle into the room where it has been applied, until the etherial vapour has been expelled. By means of a brush, the crevices of beds, and other parts supposed to contain the insect or its eggs, are to be painted with the solution.

EASY METHOD OF PULVERISING AND PRESERVING ERGOT OF RYE.

BY M. VIEL.

This simple method consists in first drying the ergot in an oven at a gentle heat, and then adding double its weight of fine loaf sugar.

Besides, the advantage of facilitating the powdering of the ergot, which is accomplished in one-third the time usually employed, the sugar possesses the property of preserving all the active properties of the ergot for many years, as M. Viel had been assured by several medical practitioners who had used it. It should be kept in small bottles, well stopped, to prevent its becoming moist.

N.B.—If ergot of rye is first well dried, and then put in a glass bottle stopped, also previously well dried, it may be kept in a good state of preservation for several years. L. B.

To Correspondents.

We shall commence a series of papers on Practical Pharmacy, by Liebig, next month, to which the first article in the present number is an appropriate introduction. When finished, they will form a concise, but complete treatise on Practical Pharmacy.

Mr. Thomas W. Walton, Derby.—Yes.

Omega.—Distil a known quantity of the wine nearly to dryness and take the specific gravity of the distilled liquid, which will show, upon reference to the tables contained in most works on chemistry, the percentage of alcohol contained therein. The specific gravity of wine is no criterion.

Mr. John Tuff's suggestions will be attended to. See the above answers.

Mr. Martin, Broadstairs, is thanked for his communication.

Justitia.—We are aware of the manœuvres of the common enemy, thanks to the solicitude of our friends, but justice will prevail.

T. L.—The dissatisfaction is extensive, though comparatively silent from want of interchange of opinions. You must go behind the scenes as the editor of a periodical, to learn its prevalence.

Communications received from Mr. Henry Cripps, Blandford Square;—Mr. Thomas Pett, Deddington;—Mr. B. Morgan, Llandilo;—Mr. W. Rogerson, Fleet Street;—Mr. Arnott, Edinburgh;—Mr. H. Winnall, Birmingham;—Mr. Knowles, Sandwich;—Mr. Charles Butler, Strand;—Mr. Moody, Camberwell.

Correspondents should send their communications earlier in the month, as we have been compelled, from their tardiness, in addition to a pressure of matter, to delay several papers until next month. In answer to several inquiries, we wish it to be understood, that "The Annals of Pharmacy" may be ordered of any bookseller, in town or country; and that we do not receive subscriptions for the year.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY,

BY JUSTUS LIEBIG,

Professor of Chemistry at the University of Giessen.

No. I.

The arrangements of a Pharmacy.

The name of Pharmacy is given to the building in which medicines are prepared, kept, and dispensed; it consists of three compartments, *viz.* the laboratory; the store-rooms; and the shop. The laboratory is the place in which medicines are made, or prepared. It must be well lighted, airy, spacious, and fire-proof. Therein are placed different stoves, among which one for drying, and the different utensils necessary for all pharmaceutical operations. A drying-room may also be distinct from the laboratory. The stoves must be placed properly so as to occupy the least possible room, and to be easy of access. The implements must be in sufficient quantity, and of the best make; those which are not in daily use, and are likely to be spoiled by dust or effluvia, ought to be kept in a separate room.

In well-arranged pharmacies there ought to be also a particular room for cutting, pounding, and sifting roots, herbs, and the like. This room ought to contain mortars, sieves, &c.

The store-room is the place in which are kept dry medicinal substances, either in their natural state or ready prepared. It is advantageous to choose for this purpose a dry room in the upper part of the house; medicines must be kept in well-closed drawers, boxes, and vessels of glass and china, all well arranged and labelled alphabetically. Nothing is more injudicious than to indicate them by numbers, and to refer to a catalogue for their specification. In well-arranged pharmacies, there is a particular room for keeping herbs and roots. Aromatic and tender herbs and flowers, such as roses, lavender, arnica, ought to be kept in vessels of glass, or in well-closed boxes of blocked tin, well guarded against the changes of the weather.

Next to the store-room is the water-cellar, or aquarium. For this purpose we must select a cool place, exposed as little as possible to the rays of the sun, wherein distilled waters, ointments, syrups, and tinctures are kept; indeed, it would be better to have also a separate room for

tinctures. Every article in the water-cellar ought also to be alphabetically labelled, and properly arranged.

The shop is the place in which prescriptions are made up and dispensed: it ought to be spacious, light, and about twelve feet high, and, if possible, opening to the north, so as to be less exposed to the rays of the sun.

The medicines here must be kept in proper vessels; distilled waters, spirits, tinctures, oils, in bottles, with ground stoppers; ointments, extracts, and the like, in jars of china or earthenware. The shape of the vessels ought to be artistical, and adapted to the nature of their contents. Dry crude medicines are kept in drawers, and wooden boxes; for substances which emit a strong effluvia, as musk, camphor, valerian, choose well-stopped china or glass vessels. No vessel ought to be used which might communicate to medicines the least deleterious quality; hence all vessels of copper or pewter must be banished from the shop.

These different vessels must be properly placed and labelled, in order to facilitate the dispensing of medicines, especially for new assistants. The medicines most in use ought to be nearest to the counter, placed all together on particular shelfs; and real poisons ought to be kept in a closed compartment, together with the scales, measure-glass, and the like used in dispensing them. A large counter, easy to access, well lighted, and furnished with drawers for the different implements, and some ready-made medicines, ought to be placed in the most conspicuous place, according to the locality of the shop. Upon the counter are placed beams of scales of different sizes, but all must be as exact as possible. The best beams are of brass, they are not so easily subject to oxidation, and are less influenced by magnetism and electricity. They ought to be of equal length, and kept extremely clean, particularly the point of equilibrium. The scales may be of brass, glass, gilded silver, or platina.

Herbs and flowers were, and are still sometimes prescribed according to the volume; a bundle, *fasciculus*, is equal to one ounce; a handfull, *manipulus*, to half an ounce; a pinch, *pugillus*, one drachm. It is evident that this mode of prescribing is far from being scientific and exact.

Liquids are prescribed according to measure, for which graduated measure-glasses are used; but as the specific gravity of fluids varies, it would be useful, in some cases, to prescribe the fluid by weight.

The mortars most commonly employed are of glass, china, wedgwood, marble, iron, bell-metal.

How to procure and preserve Medicines.

The pharmaceutist procures the medicines himself, or causes them to be collected by others, or purchases them from the wholesale druggist. By whatsoever means he procures them, his duty is to keep only the best drugs, and to destroy all those which have become injured by keeping.

Inorganic substances are generally got from the manufacturing chemist; in this case, the duty of the pharmaceutist is to see that they

be pure and genuine; but, in procuring and preserving organic substances, great attention must be paid to the following rules:—

Roots, herbs, and flowers must be collected at a proper time, and guarded against spoiling. Roots are collected in spring, before the leaves are perfectly formed, or in autumn, when the leaves have decayed; however, there are some plants the roots of which may be also collected whilst they are in full vegetation. These, however, are but general rules, and it requires a thorough knowledge of medical botany to enable one to choose the best time for collecting the roots of different plants. The roots must be cleaned, the thick ones even sliced, and dried slowly at a gentle heat not exceeding 130° Fahr., and placed afterwards in well closed boxes, in a dry place. Barks (*cortices*), woods (*ligna*), and branches (*stipites*), are gathered in spring, and even in autumn from young and healthy plants or trees. In spring also, buds, and spores (*gemmæ et oculi*), are collected. They are dried and kept in the same way as the roots.

Herbs (*herbæ*), and leaves (*foliæ*), are gathered when the plant is near flowering, on a fine dry morning. Narcotic plants form therein an exception, most of them being most pregnant with active principles when in full flower. Herbs thus collected are generally dried in the shade in a well ventilated room; however, if the season be wet, we must resort to artificial heat.

Flowers are gathered when in full perfection, at noon on a fine dry day, and dried as quick as possible. Some flowers are freed from their calyx; others are gathered together with the tender stem, and are called summitates, as absinthum.

Fruits are generally collected when fully ripe; some, for instance oranges, when in an unripe state. Some are dried like roots, as momordica colocynthis; others used immediately, when fresh, to make extracts, like momordica elaterium, or made into confections.

Seeds are to be collected after their full maturity, and cleaned and shelled.

Mosses, lichens, and fungi, are gathered when arrived at perfect maturity, and dried by means of artificial heat.

Gums, balsams, and resins, being generally, with us, exotics, are procured from the wholesale druggists, and the only care of the pharmaceutist is to see that they be genuine, as many of them are adulterated, even by the natives.

Most of the medicines derived from the animal kingdom are imported from abroad, and require the same discrimination in purchasing them as the foreign drugs. Moreover, some of them are easily injured by age, and other casualties, and must be often renewed, and the sound ones kept in well-closed vessels, in cool, airy places.

What are strictly called chemicals, ought all to be prepared by the dispensing chemist himself; and though most of them are now got from manufacturers, it is the duty of every chemist not to dispense a single article procured from a manufacturer before having it submitted to a proper test to ascertain its purity.

ON VALERIANIC ACID AND ITS SALTS.

BY MR. J. B. BARNES.

Considerable attention having of late been directed to this class of compounds, perhaps a few practical observations relating to their manufacture, &c. might be of interest to the readers of *The Annals of Pharmacy*.

Although some of the combinations of valerianic acid with bases, and the properties of those salts, have been described in the books on chemistry, yet I believe I may lay claim to the priority of the preparation of an extensive series of the combinations of valerianic acid with bases.

Valerianic acid, it is well known, occurs preformed in certain plants; and it is equally well known, that it can be produced in the laboratory by artificial means. This very fact is of great interest to the investigating chemist, as it encourages him in the belief that he will, sooner or later, be able to produce artificially, not only acids, which are known to exist in the animal and vegetable kingdoms; but that he will so far imitate Nature in her wonderful processes, as to produce the vegetable alkaloids, morphia, quina, &c., by the combination of their elements.

The acid employed in the preparation of this series, *for which I have had the honour of being awarded a Prize Medal by the Jurors of the Great Exhibition*, was prepared, in principle, the same as that directed to be used by the Dublin Pharmacopœia in the preparation of valerianate of soda, namely, the oxidation of Fusel oil by means of chromic acid. The formula I employed is as follows:—

Take of,

Bichromate of potash, . .	2 parts.
Oil of vitriol, ...	3 „
Water, ...	4 „
Pure Fusel oil	1 „

The bichromate of potash is to be finely powdered and dissolved in the water; the solution being put into a glass retort, the oil of vitriol is gradually added, and, when quite cold, the *Fusel oil* is carefully added; the contents of the vessel must be constantly agitated, and at the same time kept immersed in cold water. The deep green liquid is now distilled from a sand bath; the distillate is mixed with caustic soda, or potash, and separated from the oily fluid floating on the surface; the *valerianate of soda* is evaporated to a convenient degree of concentration, introduced into a retort, decomposed with dilute sulphuric acid, and distilled; the liberated valerianic acid is finally dried over chloride of calcium.

It is also obtained by the oxidation of oil of valerian, by means of an alkali. It is formed from fats, by treating them with fuming nitric acid; from animal nitrogenous matters, both by putrefaction and on decomposing them with strong nitric acid; and also if leucine be treated with caustic potash, or allowed to putrefy, it becomes converted into valerianic acid (no other acid being formed), ammonia and hydrogen being evolved.

It is most easily obtained in a state of absolute purity by the action of spongy platinum and atmospheric air upon potatoe Fusel oil.

Valerianic acid is composed of C_{10} H_9 O_3, H O. It possesses a well known characteristic odour, an acrid burning taste, and produces a white spot on the tongue. It boils at 348° Fahr., and dissolves in 26 parts water; it also forms a second hydrate*.

Combinations with the Alkalies.

The potash salt was prepared by saturating the acid with liquor potassæ, and evaporating carefully until aqueous vapour ceased to be given off: it should be, while still warm, cut up and preserved in well-stoppered bottles. It does not crystallize, but forms a semi-transparent colourless mass, very much resembling phosphorus in appearance. It (probably from its compactness) produces, when sharply struck with any hard body, a metallic sound, somewhat like that occasioned when a bell of camphor is struck in a similar manner. It is deliquescent, and very soluble.

The soda salt was prepared in the same manner as the potash salt, cut up into pieces while warm, and preserved in stoppered bottles; it is in snow-white masses composed of minute crystals; it is deliquescent, and very soluble. The ammonia salt was prepared by saturating the acid with strong liquor ammoniæ, and evaporating at a temperature not exceeding 100° Fahr., until crystals appeared on the surface of the liquid. When it was set aside for further crystallization, the mother liquor was allowed to drain off, the crystals were placed upon bibulous paper, and finally dried *in vacuo*, over oil of vitriol. They are of a tabular form; when held between the fingers for a moment, they become liquid. They are deliquescent, and dissolve readily in water.

Combinations with the Alkaline Earths.

The baryta salt was prepared by adding the acid to carbonate of baryta in excess, which had been previously mixed with water; a gentle heat was applied, and, when the disengagement of carbonic acid had ceased, the excess of carbonate was filtered off; the filtrate was evaporated very carefully, until aqueous vapour ceased to be given off, it remained a transparent gummy mass, readily soluble in water.

The strontia, lime, and magnesia salts were prepared in the same manner as the baryta salt. The two former are crystalline, and do not deliques by exposure to the atmosphere: they are soluble. The lime salt crystallizes in nacreous plates; it effloresces when exposed to the atmosphere; it is beautifully white.

The magnesia salt would not crystallize, therefore it was evaporated to dryness, at a temperature not exceeding 120° Fahr. It forms a light white soluble powder, sweet to the taste, and strong in the characteristic odour of valerianic acid.

Combinations with Metallic Oxides.

The alumina, chromium, and nickel salts were prepared by the direct combination of the hydrates of those bases with the acid.

* Lehmann's Physiological Chemistry.

The alumina and chromium salts are in powder, and are soluble.

The nickel salt is in crystalline masses of an apple-green colour, soluble in water.

The cobalt salt was also prepared by the direct way; the flocculent blue precipitate, obtained by precipitation from nitrate of cobalt, by means of caustic potash, after being well washed, was dissolved in valerianic acid, filtered and very carefully evaporated to dryness; it occurs in masses of a rose colour, and is soluble.

The manganese salt was also prepared in the direct way by mixing an excess of the hydrated oxide with water and the acid, allowing them to remain in contact for some time, filtering and evaporating at a temperature not exceeding 120° Fahr., until crystals appeared on the surface of the fluids; it was set aside, and after a while, the crystals were separated from the mother liquor. The latter being again evaporated, another crop of crystals was obtained; it occurs in glistening scales of a flesh colour, and dissolves very readily in water.

The valerianate of *protoxide of iron* was prepared by the double decomposition of valerianate of baryta and protosulphate of iron; it can only be kept in a state of solution, as the least heat and exposure to the air converts it immediately into the peroxide salt.

The valerianate of *peroxide of iron* was prepared by bringing together neutral cold solutions of perchloride of iron and valerianate of soda, the precipitated valerianate was thrown upon a filter, well washed, to separate the chloride of sodium, and dried without heat on a porous tile; it occurs as a bright red loose powder, perfectly soluble in alcohol.

The valerianate of zinc was prepared according to the directions in the Dublin Pharmacopœia; it occurs in small smooth crystals, somewhat like boracic acid; it is soluble in water and alcohol.

The lead salt was prepared by decomposing freshly precipitated carbonate of lead with the acid, filtering and evaporating at a low temperature. In due time, crystals made their appearance in the fluid; but (probably from the temperature being too high) they subsequently disappeared; and, upon further evaporation, it remained in the form of a syrup.

The silver salt was produced by the double decomposition of nitrate of siver, and valerianate of soda. The valerianate of silver being very insoluble, was precipitated as a white powder; after washing with cold water, it was dried in the dark on a porous tile. By exposure to the light, it becomes black.

The salt of the suboxide of mercury was also prepared by double decomposition. It is a loose, yellowish white powder.

The salt of oxide of mercury was prepared by agitating together, the yellow hydrate of the oxide with water and valerianic acid. After some time, I obtained a colourless liquid, which, upon evaporation at a temperature not exceeding 100° Fahr., yielded crystals which, however, speedily fell into a red powder; the effect, very probably, of being decomposed into the red oxide. I therefore again repeated the operation, omitting the application of heat; the solution was set aside, when, in the course of two or three weeks, I obtained this salt in prismatic white crystals.

The bismuth salt was obtained by the addition of valerianate of soda, to a solution of bismuth in nitric acid, which was nearly saturated with carbonate of soda. It occurs as a loose white powder.

The copper salt was obtained by double decomposition, and occurs as a beautiful green powder.

The cadmium salt was prepared in the same manner as the zinc salt. It occurs in crystalline scales, resembling in form that of zinc, but larger.

Combinations with Organic Bases.

The valerianate of oxide of ethyle (valerianic ether) was obtained by distilling, together, alcohol, oil of vitriol, and valerianic acid ; it was well washed, dried over chloride of calcium, and re-distilled. It is an oily liquid, with a penetrating smell of fruit, and of valerian ; of specific gravity, 0,894. (Otto). It is miscible with alcohol and ether ; it has an agreeable, cool, and aromatic taste.

I prepared the valerianate of quina, both by double decomposition, and by direct combination of the base with the acid.

That by double decomposition, was prepared by adding to a warm solution of neutral sulphate of quinine, a warm solution of valerianate of baryta ; the mixture was allowed to stand for a while, and filtered to separate the insoluble sulphate of baryta ; the filtrate was evaporated at a temperature of about 100°, until crystals made their appearance, when it was set aside for further crystallization. The crystals obtained by this process are in silky tufts and perfectly white.

The valerianate of quina, made by the direct combination of the acid with the base, was effected by triturating, in a mortar, freshly precipitated quina with water and valerianic acid, until the quina had disappeared. It was then exposed, in shallow dishes, to a current of air ; when sufficiently evaporated, octohedral crystals were formed. Valerianate of quina in both forms dissolves readily in water.

When a solution of valerianate of quina is evaporated at a temperature of 130°, it does not crystallize, but has the appearance of an oil.

From the different appearances of this salt, it is highly probable that they each differ in composition. This phenomena is worthy of a thorough investigation.

The morphia salt was prepared in the direct way. It crystallizes in silky tufts ; it dissolves readily in water.

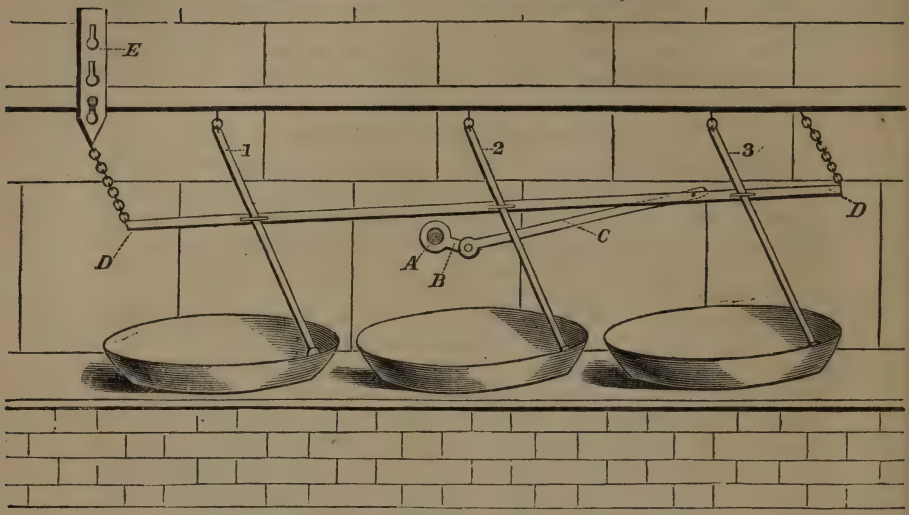
Although but three of the salts of valerianic acid are employed in medicine, namely, those of *peroxide of iron*, oxide of zinc, and *quinine*, there appears to me no reason why those of *potash*, *soda*, *ammonia*, *teroxide of bismuth*, and *oxide of ethyle* (*valerianic ether*), should not be employed by the physician.

In conclusion, I must express my sincere thanks to Mr. Savory, for his kindness in having placed at my disposal the materials necessary for the preparation of this series.

143, New Bond Street.

APPARATUS FOR STIRRING PANS WITHOUT MANUAL LABOUR.

COMMUNICATED BY A. AND W. HEMINGWAY.



Our assistant, Mr. Sidney Harvey, lately suggested that the draught of air up our flues and chimneys might be made available for stirring evaporating pans. Acting upon this idea, we have constructed a simple piece of apparatus, which answers the purpose exceedingly well.

The first motion is produced by a *fan wheel* on the principle of the common smoke jack; and, in the accompanying diagram, A. is a revolving axis communicating therewith. To this axis is attached a crank, B, which, as it revolves, moves the arm C. to and fro. D. is a stout suspended lath, provided with staples, through which pass the stirring rods, 1, 2, 3; and which, from being connected with the arm C, gives motion to them; the stirring rods are hooked on to the beam above, and can be removed at pleasure. E. is a regulator, by elevating or depressing which, the position of the lath is altered, and the action of the stirring rods is accelerated or impeded. The lath is placed a few inches in front of the crank, which causes the rods, in their movements, to describe the figure of an ellipse.

ON THE PREPARATION AND CONSTITUTION OF TARTARIZED IRON.

BY DR. G. C. WITTSTEIN.

One part of iron filings was digested in water with seven parts of cream of tartar for several months. It was then to evaporate to dryness at 212° Fahr. The resulting compound remained unchanged in the air. One hundred grains of it were digested for one hour with water, and

afterwards placed in a cold place for twenty-four hours, and then filtered. The contents of the filter were well washed.

(*a*) The undissolved residuum was granular, of a greenish and yellow colour, and weighed, when dried at 212°, 46,8 grains. In muriatic acid it dissolved completely. Sulphuretted hydrogen was passed through this acid solution until it became decolorized, during which operation sulphur was deposited. The sulphur weighed, when dried by a gentle heat, after being previously washed, 2,03 grains, indicative of the presence of 10.15 grains of peroxide of iron. The fluid filtered from the sulphur was saturated with ammonia, and treated with the sulphide of ammonium. The precipitate obtained was washed with a solution of sulphuretted hydrogen, and then dissolved in aqua regia. Ammonia was added in excess to this solution, which precipitated 11,84 grains of peroxide of iron. By deducting the above 10,15 grains of peroxide from the whole quantity obtained, there remains 1,69 grains, which is equal to 1,521 grains of protoxide of iron.

The fluid filtered from the sulphuret of iron was evaporated considerably to drive off the free ammonia and sulphide of ammonium, afterwards filtered and divided in two parts. One part left behind, when evaporated to dryness, and exposed to a red heat in a platina crucible to destroy all the carbonaceous matter, 6,48 grains of chloride of potassium, which represents 4,325 grains of potash, consequently there were 8,65 grains of potash in 46,8 grains of the insoluble residuum. The other part of the fluid was warmed, and pure carbonate of potash added by degrees to expel the ammonia. The excess of potash neutralized with muriatic acid, and the liquid evaporated to dryness, exposed to a red heat. The heated mass, which consisted of chloride of potassium and carbonate of potash, equivalent to the decomposed tartaric acid, was dissolved in water, and treated with tartaric acid until its alkaline reaction had disappeared. It required for this purpose 14,8 grains of crystallized tartaric acid, which is equal to 13,03 grains of the anhydrous acid. It follows, therefore, that 46,8 grains of the insoluble residuum contained 26,06 grains of tartaric acid.

The preceding details show that the insoluble residuum consisted of:—

	In 46,8 parts,	In 100 parts.
Potash, ...	8,650	18,650
Protoxide of iron, .	1,521	3,280
Peroxide of iron, .	10,150	21,880
Tartaric acid, . .	26,060	56,190
	46,381	100,000

Its formula is therefore 13 (K O + $\overline{T}$), 3 (Fe O + $\overline{T}$), 6 ($Fe_2 O_3$ + $\overline{T}$) + 3 ($Fe_2 O_3$ + 2 $\overline{T}$).

(*b*) The fluid filtered from the insoluble residuum (*a*) was evaporated, and gave a black shining mass, which, when triturated, formed a grey, greenish powder, and weighed 52,8 grains. It absorbed moisture from the air, and the following day had the consistence of an extract. It was dissolved in water, to which a little muriatic acid was previously added, and then treated with sulphuretted hydrogen. Sulphur was precipitated which weighed 1,58 grains, representing 7,90 grains of peroxide of iron. The fluid filtered therefrom was treated in the manner above

described, and produced 9,24 grains of peroxide of iron, which leaves, after making the necessary subtraction, 1,206 grains of protoxide of iron. By the previously described method, the liquid (*a*) was found to contain 14,403 grains of potash, and 28,9 grains of tartaric acid.

The soluble portion of the tartarized iron was therefore found to consist of :—

	In 52,8 parts.	In 100 parts.
Potash, ...	14,403	27,480
Protoxide of iron, .	1,206	2,294
Peroxide of iron, .	7,900	15,076
Tartaric acid, .	28,900	55,150
	52,409	100,000

Its formula is 9 (K O + $\overline{T}$), Fe O + $\overline{T}$, 3 (Fe_2 O_3 + $\overline{T}$).

Wittstein has further described in detail a series of investigations similar to the above one, in which he treated varied proportions of iron with cream of tartar. The conclusions he deduces from these researches are, that the tartarized iron thus prepared is a triple salt, consisting of tartrate of potash, and tartrates of protoxide and peroxide of iron, in various proportions. That the insoluble portions of the triple salt contains one equivalent of protoxide of iron to three equivalents of peroxide : that the length of time during which iron is digested with cream of tartar exercises an important influence on the nature of the resulting compound.

That when cream of tartar and iron with water are brought in contact, one equivalent of the acid combines with one equivalent of the protoxide of iron, to form which water is decomposed : the resulting tartrate of potash remains with a small quantity of the protoxide salt dissolved, but the bulk of the latter precipitates as a white powder.

That in proportion as the basic tartrate of peroxide is formed, so is more of the protoxide salt dissolved, until at last a compound perfectly soluble is produced, consisting of 8 (K O + $\overline{T}$) + Fe + T + 3 (Fe_2 O_3 + T).

That when the digestion is sufficiently long continued, all the protoxide salt in the soluble triple salt disappears, and in proportion as it is not sufficiently digested, so there is an excess of tartrate of protoxide.

That the tartrate of protoxide of iron, by the influence of the oxygen of the air, is transformed chiefly, but not entirely, especially by the application of heat, into basic tartrate of peroxide, and that one half of its acid is dissipated by the same agency into the volatile products, formic and carbonic acids.

And that the best process for making tartarized iron is by the direct combination of peroxide of iron and cream of tartar.——*Vierteljahresschrift für Praktische Pharmacie.*

[We publish the above paper principally because it contains a most instructive method of analysing the double and triple salts of iron, formed with organic acids. The process for making tartarized iron there described has now become almost obsolete in England, from the same objections to it as those stated by Wittstein.——*Editors of the Annals, &c.*]

ESSENCE OF PINE APPLE.

The above essence is, as already known, butyric ether more or less diluted with alcohol; to obtain which pure, on the large scale and economically, the following process is recommended :—

Dissolve 6 lbs. of sugar and half an ounce of tartaric acid, in 26 lbs. of boiling water. Let the solution stand for several days; then add 8 ounces of putrid cheese broken up with 3 lbs. of skimmed and curdled sour milk, and 3 lbs. of levigated chalk. The mixture should be kept and stirred daily in a warm place, at the temperature of about 92° Fahr., as long as gas is evolved, which is generally the case for five or six weeks.

The liquid thus obtained, is mixed with an equal volume of cold water, and 8 lbs. of crystallized carbonate of soda, previously dissolved in water, added. It is then filtered from the precipitated carbonate of lime; the filtrate is to be evaporated down to 10 lbs., when 5½ lbs. of sulphuric acid, previously diluted with an equal weight of water, are to be carefully added. The butyric acid, which separates on the surface of the liquid as a dark-coloured oil, is to be removed, and the rest of the liquid distilled; the distillate is now neutralized with carbonate of soda, and the butyric acid separated as before, with sulphuric acid.

The whole of the crude acid is to be rectified with the addition of an ounce of sulphuric acid to every pound. The distillate is then saturated with fused chloride of calcium, and re-distilled. The product will be about 28 ounces of pure butyric acid. To prepare the butyric acid, or essence of pine apple, from this acid, proceed as follows:—Mix, by weight, three parts of butyric acid with six parts of alcohol, and two parts of sulphuric acid in a retort, and submit the whole, with a sufficient heat, to a gentle distillation, until the fluid which passes over ceases to emit a fruity odour. By treating the distillate with chloride of calcium, and by its re-distillation, the pure ether may be obtained.

The boiling point of butyric ether is 238° Fahr. Its specific gravity, 0,904, and its formula $C_{12}\,H_{12}\,O_4$, or $C_4\,H_5\,O + C_8\,H_7\,O_3$.

Bensch's process, above described, for the production of butyric acid, affords a remarkable exemplification of the extraordinary transformations that organic bodies undergo in contact with ferment, or by catalytic action. When cane sugar is treated with tartaric acid, especially under the influence of heat, it is converted into grape sugar. This grape sugar, in the presence of decomposing nitrogenous substances, such as cheese, is transformed in the first instance into lactic acid, which combines with the lime of the chalk. The acid of the lactate of lime, thus produced, is by the further influence of the ferment changed into butyric acid. Hence, butyrate of lime is the final result of the catalytic action in the process we here have recommended.

ON CASTOR.

BY E. WEBER AND C. G. LEHMANN.

Accurate anatomical observations have induced E. Weber to draw the following important results concerning the nature and origin of castor :—

1. Castor is the accumulated exudation of the prepuce of the penis and clitoris, which prepuce has two saclike dilatations, called castor-bags.

2. Castor is not derived from glands, but from the exudation of the skin of the prepuce, which is highly vascular.

3. Castor contains also the accumulated particles of the cellules of the prepuce, which continually fall off, and are renewed in succession.

4. Its pungent smell is derived from small fatty globules, originally existing in the elementary cellules, of which the upper skin is formed, and sometimes penetrate through the envelopes of the dehiscent cellules of the upper skin, and form themselves into larger globules.

5. Since the prepuce, and its appendages, come in contact with urine, it is probable that those calcareous substances which I have found in the castor-bags of a recently-killed castor, are sediments of the urine.

6. Canadian-dried castor-bags, when moistened, present a formation similar to that of the Russian bag, and that of the castor found in Germany, but contain also a greater quantity of calcareous masses, which, when dry, are similar to resinous matter, the smell of which is not only weaker, but even different to that of the Russian castor.

Lehmann investigated, comparatively, castor and the exudation (*smegma*) of the præputium of horses and men, and found that castor was nothing else but an exudation of the prepuce, differing in odour from that of other animals, only on account of the difference of the peculiar food of the castor.

Lehmann examined, at first, fresh German castor, by means of the microscope; and observed, in its soft mass, three kind of crystals, which appeared more clear in the residuum of the mass which was previously treated with ether and alcohol. The crystals, which occurred less frequent, were those of the twinform sulphate of lime;—a fact proved also by the measurement of the angles, and by chemical analysis.

The numerous prismatic crystals appeared to be formed of carbonate of lime, which proves that the carbonate of lime which is found in the ashes of castor, occurs ready-formed in the same; a fact which explains the effervescence which takes place if castor is treated with acids; the third class of crystals, consisted of oxalate of lime, presenting square pyramids. No uric acid could be detected therein.

Lehmann afterwards took fresh German, Russian, and Canadian castor, all three previously dried in vacuo, and treated them first with ether, afterwards with alcohol, water, and diluted acetic acid, and obtained the following results:—

	German.	Russian.	Canadian.	
Extract with ether, ...	7,4	2,5	8,249	pr. c.
„ „ alcohol, ...	67,7	64,3	41,340	„
„ „ water, ...	2,6	1,9	4,795	„
„ „ diluted acetic acid, carbonate of lime,	14,2	18,5	21,365	„
„ „ diluted acetic acid, albuminous substance,	2,4	3,4	5,841	„
Epithelium and pellicles, . .	5,7	9,4	18,510	„

Cholesterin, in rhomboid scales, was separated from the ethereal extract of German castor. This ethereal extract, treated with water, gave, with sulphuric acid and sugar (Pettenkoffer's test for bile), a beautiful purple colour; that of the Russian gave, also, a reaction of bile; however,

that of the Canadian afforded only a cherry colour. This reaction could not be produced by treating the alcoholic extract with water; hence, castor is similar to dry human fæces; mineral and organic acids produce in this extract considerable opacity. Neither in the Russian nor the Canadian castor could be observed those crystals, which were detected in the German; however, by chemical analysis, the presence of the same combinations of lime could be detected.

By adding muriatic acid to watery solutions of ethereal extracts of Canadian castor, crystals were deposited, which, under the microscope, had all the appearance of phosphates of magnesia. Heated in a glass tube, they emitted a faint smell of hydrocyanic acid; in the cooler parts of which were deposited some drops of oily substance, and a white sublimate with an acid reaction, the nature of which could not be perfectly ascertained (perhaps hippuric, or benzoic acid).

The existence of albuminous matter in the solution of the acetic extract of the fresh German castor, was proved by ferrocyanuret of potash; and, in the Canadian, by concentrated nitric and muriatic acids. Carbolic acid, which Woehler discovered in the ethereal oil of castoreum, could not be detected, either by muriatic acid (according to Runge), or by nitric acid (according to Laurent).

This analysis harmonises with those which have been made before, of the different kinds of castor. The reason why the German castor contains less particles of skin than the Russian and Canadian is, because only the interior soft mass of the German is employed, whilst the whole bag of the Russian and Canadian bag is subject to analysis. The difference in the organic elements depends not only on the age, and season, but chiefly on the difference of food; the Canadian castors feed upon different kinds of pines, the Russian on birch, and the German on willows; this explains, fully, the difference in the less or greater amount of resins and salts found in the different kind of castor.

Lehmann afterwards subjected to experiments, the preputial exudation of horses and men, dried in vacuo, with the following result:—

	SMEGMA PRÆPUTII.		
	Horse.	Man.	
Extract with ether, ...	49,9	52,8	pr. c.
„ „ alcohol, ...	9,6	7,4	„
„ „ water, ...	5,4	6,1	„
„ „ dil. acet. acid, { salts, .	5,4	9,7	„
„ „ dil. acet. acid, { albuminous substance,	2,9	5,6	„
Insoluble	26,8	18,5	„

The ethereal extracts were much similar, containing saponifiable fats, cholesterin, and a fat which was neither capable of saponification or crystallization; that of the man was sweetly pungent; none had the smell of castor. The aqueous solution of the ethereal extract gave the reactions of bile, which did not occur in the alcoholic extract. By adding an acid to the alcoholic solution of the smegma of the horse, a pulpy unctuous mass was obtained, composed of benzoic acid and fats. The alcoholic solution of human smegma, reacted acid; and, by addition of an acid, deposited only a few flocculi, consisting probably of phosphoric acid salts. In the watery extract, and in the residuum, were

found the same salts which were observed in castor, except that in human smegma some uric acid was detected. Acetic acid detected also, in both, the same albuminous substance which is found in castor; however, pure albumen or casein could not be detected.

The analysis of both smegmas, and their comparison with those of the different species of castor, offer a great analogy, particularly in the following points .—

1. They all observe, in their solutions, the reactions peculiar to most of the constituents of bile. 2. They contain a saponifiable fat. 3. An unsaponifiable fat, soluble; or, at least, easily divisible in water (castorin). 4. A fatty acid, or resinous acids combined with alkali, the acids of which are replaced by stronger ones. 5. Albuminous matter derived from the envelopes of the globules of fat dissolved by acetic acid. 6. Some elements which are only found in excreta; hippuric, benzoic, and uric acids, oxalate, carbonate, and phosphate of lime and magnesia. 7. Fragments of epithelium, which are always found in the glands of the upper skin.

The food peculiar to the castor, namely, the resinous barks of the pine tree and birch, accounts for its smegma containing more resinous elements, and that of the horse and man more fatty matters; and the occurrence of carbolic acid is owing to the decomposition of resins, of salicylic acid, and the salicylate of ammonia. By dry distillation, carbonate and oxalate of lime are more abundant in the excreta of herbivorous animals; on the other hand, the smegma of man contains more earthy phosphates. The difference in the nourishment accounts, likewise, for the occurrence of hippuric and uric acids.

IMPROVEMENTS IN THE MANUFACTURE OF POTASSIUM.

BY M.M. MARESKA AND DONNY.

The process ordinarily employed in the manufacture of Potassium, is that invented by Brunner, which consists in exposing to a very great heat, an intimate mixture of charcoal and carbonate of potash, the produce of the calcination of crude tartar. Experience has shown that a given mixture of this kind, does not invariably yield the same quantity of potassium, notwithstanding the greatest care which may be taken.

The operation, often a very unproductive one, is also attended with many dangers and difficulties, arising from obstructions in the pipes, caused by deposits of carburetted products; obstructions which often occasion disastrous explosions. The attention of M.M. Mareska and Donny having been called to these points, they have endeavoured to ascertain the defects of the present process, and to suggest suitable remedies.

Their attention was first directed to the action which potassium suffers from the carbonic oxide which is formed in the manufacture. It was well known that carbonic oxide, which has no action on potassium at a bright red heat, has a very powerful effect on it at lower temperatures; but M.M. Mareska and Donny have shown, by a very simple operation, that when a mixture of carbonic oxide and potassium vapour is collected in a *large* receiver, kept *quite cool*, the potassium does not

condense in a metallic state, but that a carburetted product is formed, from whence the metal cannot be obtained by simple distillation.

In Brunner's process, the potassium, set at liberty by the reaction of carbon on carbonate of potash, is condensed in the tube placed intermediary between the retort and the receiver, or in the receiver itself, or else it is carried off by the gases out of the apparatus.

The result therefore is, that, in Brunner's process, the chief quantity of potassium must be lost, only a small portion being saved, which, being condensed in the tube, continues sufficiently fluid to run into the receiver. The portion which solidifies in the tube, being there exposed to the contact of carbonic oxide, forms carburetted products, and thus becomes, as already noticed, the source of insurmountable and oftentimes very dangerous explosions.

That part which continues in a state of vapour when it reaches the receiver, and which afterwards condenses, is also lost; for the researches of M.M. Mareska and Donny have shown that it passes completely to the state of a black substance, not reducible by heat.

To prevent these obstructions, it has been recommended that the intermediary tube should be made as short as possible, and M. Mitscherlich adds to this recommendation the useful advice, to maintain it at a red heat up to the point of its connection with the receiver, in the hope that the metal would condense in the less heated part of the tube, and run, drop by drop, into the receiver. M.M. Mareska and Donny observe, that by limiting to a sufficient extent the condensing surface of the pipe, we may effectively diminish the space in which these obstructions occur, and the difficulty of overcoming them by means of the iron rod with which the apparatus is furnished; but we cannot, by these means, entirely remove the difficulties, because, however limited may be the portion of the tube where the metal is condensed, we cannot prevent a part from passing to a solid state, remaining so, and by becoming carburetted, forming a source of obstruction.

Again, nothing is more difficult than to maintain, at a sufficiently low temperature, the lower part of a metallic tube, the remainder of which is kept at a red heat. The greater part of the potassium reduced, escapes in the state of vapour the whole length of the tube, and, on arriving in the receptacle, is lost.

From these facts, M.M. Mareska and Donny conclude, that the only means of entirely avoiding the obstruction, and diminishing the loss of potassium, consists in abandoning the idea of effecting the condensation of the potassium vapour in the intermediary tube of Brunner's apparatus, and the substitution (for this receiver which condenses nothing, or which condenses only carburetted potassium) of a receiver in which the vapour solidifies in the metallic state, and in which the metal can, as much as possible, be protected from the alteration which carbonic oxide causes it to undergo. The condensation no longer taking place in the tube, this may be kept, throughout its entire length, at a temperature at which the action of carbonic oxide is impossible.

After having tried a great number of receivers, M.M. Mareska and Donny have adopted the following construction, as best answering the purpose required:—

They adapt to the connecting pipe, a kind of elongated and flattened box, open at the two ends, one of which terminates in a round collar, to permit of its being applied to the intermediary or retort pipe. This box is formed of sheet iron of the thickness of four millimètres. Its length is thirty centimètres, and its depth six millimètres in the clear.

Amongst the other causes which exert an influence on the progress of the operation, and which has escaped the attention of chemists, M.M. Mareska and Donny call attention to the relative quantities of charcoal and carbonate of potash in the mixture from whence the potassium is obtained.

The most suitable proportions, and which occasion no inconveniences during the process, are those indicated by the theory of equivalents. Before proceeding with the extraction of the metal, it is of importance that an analysis of the charcoal of the tartar should be made; and if this is found not to contain the exact quantity of carbon required for the reduction of the metal, white cream of tartar must be mixed with the crude tartar, and the mixture varied until the calcined product obtained, furnishes the required proportions.

The calcination of the bitartrate should be made in vessels quite impermeable, and in which the cooling may be effected without contact of air, in order to avoid the formation of cyanide of potassium, which is also another source of loss.

All who are employed in the manufacture of potassium, know the inconveniences attendant on the employment of clay luting. M. Dumas has decidedly rejected its use.

Notwithstanding the heat necessary for the reduction of the metal is such that, spite of the most minute precautions, an operation is scarcely ever completed without the breakage of the retort, M.M. Mareska and Donny have succeeded in avoiding the inconveniences arising from the employment of clay luting, and preventing the destruction of the retorts, by running on them, when they are at a dull red heat, a quantity of borax, sufficient to coat them with a vitrifiable varnish.

By following out in practice the method thus described, M.M. Mareska and Donny have succeeded in obtaining a considerable increase in the quantity of metal produced, and have obtained from 150 to 200 grammes of potassium at each operation. They possess a specimen of 400 grammes of pure metal, in pieces of 50 to 60 grammes each; this specimen was the result of three operations.

These gentlemen are now investigating the most efficient modes of purifying this metal;—a metal which has rendered important services to science, and which bids fair to be of still greater value, if efficient means could be devised for obtaining it at a cheaper rate.

In conclusion, they are of opinion that the modifications above suggested in Brunner's process, are not the only ones of which it is susceptible; but they feel convinced that no important improvement can be effected, except by close adherence to the principles above laid down; that is to say, by renouncing the use of spacious receivers,—ceasing to condense the vapours in the retort tube,—and observing closely the precautions above pointed out.

THE PHARMACY BILL.

"LEGISLATION," it has been remarked by no mean authority, "is a series of compromises." Whilst we regard this proverb to be unfortunately but too true with reference to the proceedings of modern lawgivers, we fear that the statesman, who attempts to legislate solely by compromises, and without a due consideration for the public good, will produce measures so emasculated by the desire to conciliate all parties that they will prove to be a source of benefit to none.

Of something allied to this character we consider the late Pharmacy Bill. England and Scotland approved of it. The Colleges of Physicians and Surgeons tacitly supported it. The Apothecaries' Company would not oppose it. The chemists and the public petitioned for it, and yet it did not pass into law.

With propriety, it may be asked Why? The answer is, we believe, that the Government foresaw that the Bill had been so pared down by the pruning knife of its projectors, with a view to avoid opposition, that it ceased to be a measure of a permanent character, and one little calculated to promote the public weal.

For, under the provisions of this Bill, any huckster not calling himself a pharmaceutical chemist, &c. or implying that he was registered under this Act, might carry on the business of a chemist and druggist, by dispensing prescriptions, and selling drugs and chemicals. Its penalties were solely directed against the assumption of certain names, symbols, and titles.

Lest we should be charged with inconsistency, we do not hesitate to avow, that we supported this Bill last session, and shall do so again this year, if the opportunity occurs, deficient as it is of protection to the educated pharmaceutist, and the drug consuming public, because we regard it as an advance on the no-legislation principle of past times.

What we desire to see passed into a law is a bill not of a retrospective character, but one which compels for the future every person to undergo a strict examination as a test of his qualification to act as a pharmaceutical chemist, and one which precludes every person not having passed such examination from acting in the capacity of a dispenser of medicines, &c. under certain penalties.

We believe, that such a bill would meet with the support of the higher grades of the medical profession, providing it did not interfere with the privileges of the licentiates of the Apothecaries' Company, and was of a tendency to discourage anything favouring the usurpation of the functions of the duly qualified prescriber.

Of course, a bill of this description would arouse the opposition, as an invasion of their rights, of the hucksters which abound in rural

districts, as well as of those who derive a revenue by supplying those unskilled traders with their medicinal simples and compounds. But we would inquire, was ever any great or good enactment carried through Parliament without exciting the ire of some section of the community, who oftentimes receive, thereby, a real and not an imaginary injury?

The spirit that ought to pervade all legislative proceedings is contained, we hold, in the aphorism of Jeremy Bentham, "the greatest good of the greatest number."

We call attention to this subject now, because, before many weeks have elapsed, it will in all probability engage the consideration of the Legislature. It therefore behoves pharmaceutical chemists at once seriously to mediate upon the advantages and evils with which the late Pharmacy Bill was likely to surround their position, with a view to suggest such alterations and improvements, as may conduce to their common good.

Any measure likely to give satisfaction to a majority, must be the reflex of the well-digested views and requirements of that majority, and not the concoction of one or two individuals of necessarily limited experiences, and oftentimes of narrow prejudices.

Whether there be or not a Parliamentary Committee to inquire into this question, it is obviously the height of impolicy for those interested in a matter paramount at present to every other consideration, to rest listlessly and supinely, whilst a measure is in contemplation, which may damage or improve the circumstances on which their very prosperity depends, or, to say the least, which may not confer the greatest amount of benefit.

There can be no doubt, that the parties most concerned in any legislative proceedings will, at all times, receive from Parliament every consideration, as being best acquainted with their own position; consequently, if pharmaceutical chemists will not take the initiative in making known their opinions and feelings, in language loud enough to reach the Parliamentary ear, they will have nobody to blame but themselves, should an enactment be passed, either detrimental to their interests, or little calculated to promote their future welfare. We have every reason to believe that such a measure, as previously indicated, would receive the sanction of Parliament, if pressed forward by the united efforts of the pharmaceutical community of this country.

By raising the standard of education to the greatest attainable height amongst pharmaceutists, and by legislative protection conferred as a legitimate reward for the superior qualification which such education would bestow, we trust and believe the day will be hastened when there will exist but two principal divisions in the practice of the medical art,—the prescriber and the dispenser.

THE PHARMACEUTICAL SOCIETY.

THERE are knaves in every community. In all governments, whether of kingdoms, parishes, or societies, there are some individuals who originate and unite in promoting any plausible movement which tends to their own advantage, upon the pretext of benefiting others, and whose talents consist in abusing those who manifest any opposition to their designs. This opposition, from whatever motive it may proceed, has its advantages as well as its penalties; for, sooner or later, it exercises a wholesome restraint on the dishonestly disposed, and opens the eyes of their victims to the wrongs inflicted upon them.

When abuses arise, there is oftentimes a constitutional mode of rectifying them; but this mode will be always inoperative, where there is a venal press, which has a direct interest in suppressing the truth and burking inquiry, from its writers being numbered amongst either the corruptors or the corrupted.

Should, however, any persons, despite these disadvantages, persist in the straightforward course of exposing the machinations of these knaves, they will endeavour, by inuendoes, by garbled statements, and imputation of base motives, for which they usually enjoy a celebrity in constructing, to bespatter the characters of such persons, who may consider themselves truly fortunate if only a small portion of the mire adheres which is levelled at them.

This latter proceeding has been taken by a few persons pretending to have the interests of the Pharmaceutical Society at heart, and we advert to it for the purpose of reminding the members, that, whatever defects exist in its management, the remedy is in their own hands.

The Pharmaceutical Society was established for the avowed purpose of uniting the chemists and druggists of this country, and raising their social, legal, and educational position.

As these desirable objects have not been accomplished, and as there are, in consequence, numerous dissatisfied persons in and seceders from the Society, it becomes the serious duty of the well-wishers of this institution, to inquire into the causes of the dissatisfactions, and the secessions, with a view to suggest remedies.

In making these inquiries, we caution those who have the courage to attempt it, not to disturb the delightful unanimity and harmony that prevails amongst those who consider that they have a vested right, rendered sacred by ten years' undisturbed enjoyment of the same, to the positions and the benefits they derive from their connection with this Society; because it is an established axiom with these worthies, that the Society would be a model of perfection, if entirely directed by their infallible judgment, and their self-denying zeal.

We need not observe that it is considered the height of profanity to doubt the justice of this self-idolatry, and that it is quite suicidal to incur the vengeance of these egotists, who, like the *three tailors* of Tooley Street, regard "The Pharmaceutical Society" as themselves.

However, we apprise these Nebuchadnezzars that there are some humble individuals who will not fall down at the sight of the golden image they have set up, and are not to be deceived or intimidated by such fustian. They may stave off inquiry by pretending to desire it, and by various other specious plausibilities;—they may postpone the hour of judgment by blandishments given to those whose duty it is to pronounce this judgment;—but, as certainly as the day follows the night, it will come, and the longer it is delayed the more severe will be the retribution on themselves, and the greater the injury inflicted on the Society.

As far as ourselves, and those who think and act with us are concerned, we have nothing to fear, for the path of duty is the path of safety; and we have already been rewarded with an unscrupulous hostility for our advocacy of various reforms, some of which (the more deadly our crimes) have been notwithstanding carried. There is, moreover, the consolatory reflection left for us, that the denunciations of some men are as impotent as their designs are wickedly selfish and transparent.

PHARMACEUTICAL BOARD OF EXAMINERS FOR SCOTLAND.

By an arrangement entered into between our brethren on the north side of the Tweed and the Council of the Pharmaceutical Society, a Board of Examiners, composed of eight Scottish chemists and the President and Vice-President of the Society, are to sit at such times as may be found necessary, in Edinburgh, to test the qualifications of those pharmaceutists who may be desirous of joining the parent Society, or of obtaining its diploma. We believe this compact will add to the ranks of the Society some of the most intelligent and respectable members of the Pharmaceutical community, although we do not think it will contribute at present to its financial prosperity, unless there is a much larger accession of members than we are justified in anticipating.

LIBRARY OF THE PHARMACEUTICAL SOCIETY.

The Council have determined that, on and after the first of February, the Library shall circulate amongst the members. The books may be obtained by written or personal application under certain rules, a copy of which will be issued with each book. We trust that this new feature of the Society will prove acceptable to its supporters, as previously the Library has been comparatively useless, in consequence of the members not being disposed to read the books at the Society's house.

Reviews.

A Translation of the New London Pharmacopœia: *Including, also, the New Dublin and Edinburgh Pharmacopœias, with a full account of the chemical and medicinal properties of their contents; forming a complete Materia Medica, by* J. Birkbeck Nevins, M.D. Lond. M.R.C.S. and L.A.C., &c. &c. London: Longman, Brown, Green, and Longmans; 1851.

This translation by Dr. Nevins has been reviewed by some critics with an unmerited severity, which would be inexplicable on any other ground than that of rival authorship, and by others, as though the work were free from all imperfections. Indiscriminate praise or blame is unjust to the author, and treacherous to the reading public, for few persons will take the trouble to have the acid of one review neutralised with the alkali of another, by a perusal of several criticisms, or by forming an independent opinion of the work itself.

After a careful examination of Dr. Nevins' translation, we feel no hesitation in stating that it is the most comprehensive work on the new Pharmacopœias that has yet appeared. It was written, as the author states, to meet the difficulties and wants of students, with which he became acquainted as a medical tutor in Guy's Hospital. Speaking as pharmaceutical chemists, not competent to give a judgment on the medical portions of this book, we are bound to say that Dr. Nevins has succeeded in the execution of his plan.

He brings clearly and boldly before the mind of his readers, all the important facts and theories concerning the various substances of the Pharmacopœia, especially in their chemical relation. After the characters and tests for each substance, he adds a section, which is as valuable as it is novel, when fully carried out. It is a description of the distinguishing peculiarities of each body, for which the one under consideration might be mistaken. In the article on iodide of mercury, we find the following example:—

"*Powders for which it may be mistaken:—Iodide of lead; ammonia-chloride of iron; sesquisulphuret of arsenic; powdered mustard.* It is distinguished from all these, except the arsenious compound, by its volatility when heated, and from that by its insolubility in liquor potassæ, in which the sesquisulphuret of arsenic is soluble."——Page 451.

We quote the above to show the plan, and at the same time to find fault with the instance. The author forgets that ammonia-chloride of iron *is volatile*, therefore cannot be distinguished from iodide of mercury by this test.

We do not wish to be hypercritical, but we would suggest to Dr. Nevins that, in many parts of his work, his style is too obscure; especially when it is recollected that this book was written expressly for students, for whom it ought not to be presumed that they have any preliminary knowledge of the subjects treated of. For instance, he writes that,—

"Æther is but slightly soluble in water, from which it separates after being shaken with it."——Page 114.

From this passage, any person ignorant of the matter would conclude that by shaking the aqueous solution of æther, it will separate from the water in which it is slightly soluble.

Dr. Nevins, in the article on sal volatile, asserts—

"That the quantity of the materials ordered for making the ammoniacal ingredient in this spirit, is one-fourth greater than it was in the last pharmacopœia; and as it was more than could be dissolved by the spirit, even then, it will be still more the case at present."——Page 615.

Now, if he means to say, by this ambiguous paragraph, that the quantity of carbonate of ammonia formed from the decomposition of the hydrochlorate of ammonia and carbonate of potash ordered, is insoluble, both according to the previous and present Pharmacopœias in the prescribed mixture of spirit and water, we beg entirely to dissent from this assumption, and recommend him to try the experiment.

Another statement of the author is still more surprising, namely, that

"Sulphate of copper is not liable to fraudulent adulterations."——Page 393.

In contradiction to this remark, we may observe that it has been found frequently to contain as much as 50 per cent. of sulphate of iron, which quantity we presume Dr. Nevins would consider a fraudulent and not an accidental adulteration.

We fear that the author's chemistry is, in some few instances, not quite up to the present standard of knowledge on that subject. In proof of which we may offer the subjoined passage:—

"As all the compounds of soda are soluble, there are no tests which form precipitates, by which it is further distinguished from potash."——Page 519.

If Dr. Nevins had consulted any recent work on chemical analysis, he would have learnt that Fremy's acid meta-antimoniate of potash is a test for soda, in consequence of the metallic acid precipitating that base; consequently there is a salt of soda which is insoluble.

Again, we do not think Dr. Nevins' method of detecting the presence of sulphuric acid with acetate of lead, in citric acid, the most eligible one, for it must necessarily exist therein, but in small quantities, and sulphate of lead is not, as he states, insoluble in nitric acid; therefore this test would be very liable to mislead any person who relied upon it. In justice to him, however, it should be mentioned that the London Pharmacopœia recommends the employment of acetate of lead evidently for the same purpose, although it is not so stated.

As our space is limited, and as the good characteristics of this treatise on materia medica—for it is much more than a mere translation of the pharmacopœias—infinitely counterbalance its short forthcomings, we must content ourselves by recommending our readers to possess it, if they desire to consult a work which is complete in itself, without being overloaded with unnecessary details. When we reflect how short a period must have been necessarily devoted to the execution of this work, we cannot estimate too highly the industry and talents of Dr. Nevins. This circumstance will, no doubt, fully account for, but not justify, the errors we have deemed it our duty not to pass over in silence, however apologetic it may be for the author.

FAMILIAR LETTERS ON CHEMISTRY, *in its relation to Physiology, Dietetics, Agriculture, Commerce, and Political Economy.* By JUSTUS VON LIEBIG. Third edition, revised and much enlarged. London: Taylor, Walton, and Maberly, Upper Gower Street, and Ivy Lane, Paternoster Row. 1851.

How gratifying it is to witness the gigantic mind of Liebig, stepping aside from its abstruse researches, like our own Faraday, to popularise the science it cultivates with such wondrous success. To learn what Chemistry is in its most enticing, and delightful, and even poetic aspect, these "Familiar Letters" must be perused; for certainly no work in the English language is at once, to the uninitiated, so interesting and instructive. It conveys the most recondite theories of chemical philosophy, in a garb so inviting and intelligible, that the merest tyro in this science will feel the grandeur of its truths, the incalculable services of its applications to the benefit of mankind, and the marvellous simplicity of the laws which govern the material universe, as revealed by its study.

Speaking favourably of what chemistry has done in producing artificially substances which were only formerly obtained as the result of vital action, he observes:—

"The chemist produces the crystalline substance found in the allantois of the cow from the excrements of snakes and birds: he makes urea from charred blood; sugar, oxalic acid, and formic acid, from sawdust; the volatile oil of spiræa ulmaria, of Grealtheria procumbens, from willow bark; the volatile oil of valerian from potatoes. These results are enough to justify us in entertaining the hope that we shall ere long succeed in producing quinine, and morphine, and those combinations of elements of which albumen and fibrine, or muscular fibre, consist, with all their characteristic properties."

Judging from past experiences, a long theme might be written on the hopeful capabilities of modern chemistry. Transmutation of the alchemists, or, at least, something closely allied to it in its results, seems almost within our reach at the present period, reasoning from the data given in a brilliant paper by Dumas, and approved by Faraday, at the last meeting of the British Association. On this point Liebig remarks in these Letters:—

"In our day men are only too much disposed to regard the views of the disciples and followers of the Arabian school, and of the late alchemists, on the subject of the transmutations of metals as a mere hallucination of the human mind, and strangely enough to lament it.

"Many of the fundamental or leading ideas of the present time appear to him, who knows not what science has already achieved, as extravagant as the notions of the alchemists. Not, indeed, the transmutations of metals which seemed so probable to the ancients, but far stranger things are held by us to be attainable. We have been so accustomed to wonders, that nothing any longer excites our wonder. We fix the solar rays on paper, and send our thoughts literally with the velocity of lightning, to the greatest distances. We can, as it were, melt copper in cold water, and cast it into statues. We can freeze water into ice, or mercury into a solid malleable mass in white-hot crucibles, and we consider it quite practicable to illuminate most brightly entire cities with lamps devoid of flame or fire, and to which the air has no access. We produce artificially ultramarine, one of the most precious minerals; and we believe that to-morrow or next day some one may discover a method of producing from a piece of charcoal a splendid diamond; from a bit of alum, sapphires or rubies; or from coal tar, the beautiful colouring principle of madder."

Chemistry being that science which administers by its discoveries more than any other to the wants and comforts of man, there is, no doubt, a great future awaiting its assiduous and, consequently, successful cultivation. The artificial formation of the vegetal alkalies is, to the pharmaceutical chemist, one of the most interesting and important problems that can engage his attention. Much valuable information may be gained on this subject by studying the methods already known, by which many remarkable organic bases have been produced. Still greater knowledge can be acquired by studying what means nature employs in the economy of plants to create them, especially when the object is to form artificially those organic bases which are of natural origin, as atropine, strychnine, &c.

Our inquiries might be directed to ascertain if any of the usual constituents of the plant are absent in greater or less degree, according to the quantity of the alkaloid present, and also if it be by the metamorphosis of the nitrogenous principles of the vegetable structure that these bodies are produced. In fact, as Liebig observes, it is putting questions such as these, by the skilful inquirer, to nature, that the truths of science are elicited ; and, moreover, as he clearly shows in these Letters, that Nature herself works through, and not in defiance of, the known laws of Chemistry.

One of the most masterly specimens of reasoning and examination of statements which have passed current for facts is to be found in this book, in the chapter on the spontaneous combustion of the human body, where Liebig evidently demolishes *con amore* both the theory and the so-called facts, that it makes us wonder how such a doctrine could ever have existed and found advocates.

The Official Illustrated and Descriptive Catalogue of the Exhibition of 1851. London: Spicer, Brothers, and W. Clowes & Sons. 3 vols. 1851.

We take the earliest opportunity afforded us of noticing this truly magnificent work, which, though possessing the title of a catalogue, forms a valuable addition to the class of really practical treatises on the arts and manufactures.

Our readers must not for a moment suppose, that this valuable work is a simple enlargement of the smaller catalogue, with a more amplified description of the objects exhibited ; this is but one feature of the work, which, in addition, is abundantly enriched with annotations on the products and manufactures of the world, from the able pens of Professors Owen, Liebig, Lindley, Royle, Ansted, Hunt, &c., &c. ; together with contributions of a technical character from a number of men, each occupying the first position in the department consigned to him.

The commissioners of several of the foreign states have also furnished much valuable information relative to the arts and manufactures of their respective countries. The result has been that, with this combination of talent, conjoined with careful editorial management, a work of great public interest has been produced, serving not merely the purpose of a memento of the Exhibiton, but as a book of reference on all sub-

jects connected with the arts and manufactures of our own and foreign countries; a work, without which no library will be complete.

In an artistic point of view, the Illustrated Catalogue is one of rare excellence, and the splendid engravings it contains gives it a claim to a place on any drawing-room table.

NEW TEST FOR UREA.

BY PROFESSOR LIEBIG.

When to a strongly alkaline solution of urea in caustic potash is added, by drops, a solution of bichloride of mercury, a brilliant white precipitate is obtained, which is a combination of urea with peroxide of mercury.

A diluted aqueous solution of bichloride of mercury mixes, as is well known, with an excess of a solution of bicarbonate of potash, except that at first a precipitate is produced. If a solution of urea be added to this mixture, immediately is formed the above-mentioned white precipitate of urea and peroxide of mercury. This compound is so little soluble in water, that, with the assistance of this method, $\frac{1}{3000}$ part of urea in a liquid, can be with certainty indicated. From urine, the whole of the urea can be completely precipitated by this means, and it appears applicable for the determination quantitatively of urea in animal fluids. I shall in a short time describe the most suitable method to accomplish this object.

When freshly precipitated, oxide of silver is introduced into a watery solution of urea; it changes in a few hours, especially in a gentle heat, into a grey or yellow grey, granular powder, which, under the microscope, exhibits transparent crystals. Heated to dryness, this compound evolves ammonia, and cyanate of silver remains, which, by further heat burns, and produces dicyanide of silver, and at last pure silver.——*Annalen der Chemie und Pharmacie.*

Since the appearance of the above paper, a communication by Liebig, on the same subject, has been read at the Chemical Society. He now recommends a solution of nitrate of mercury as the precipitating agent for urea, and that the urine shall be fresh, and retained neutral by the frequent addition of baryta water, as long as the urea continues to fall, with the precaution not to add the caustic earth after all the urea has been precipitated, or the compound of urea and mercury will be contaminated with uncombined oxide of mercury. To estimate urea quantitatively, he advises that a standard solution of pure urea should be made to ascertain the strength of the nitrate of mercury solution used to precipitate the urea. When this is known, the quantity of urea present in urine can be readily determined by a simple calculation of the quantity of the precipitating agent employed. Liebig states, that from upwards of a hundred trials, he is satisfied that this test succeeds admirably, especially as it precipitates completely the whole of the urea present, and no other constituent of fresh urine.

ON THE COMBINATIONS OF MERCURY WITH ALKALOIDS.

BY FREDERICK HINTERBERGER.

Chloride of Quinine and Mercury.—Dissolve equal parts of pure quinine and bichloride of mercury in strong alcohol, separately; mix both solutions, adding, previously, to that of quinine, a few drops of muriatic acid; in a short time a precipitate appears of granulated crystals. It being difficult to dissolve them in cold alcohol, ether, or water, they may be easily washed on the filter. Dried at 212°, they remain unchanged. From the analysis of this substance results the formula,—$C_{20}\ H_6\ N\ O_2 + H\ Cl + Hg\ Cl$.

Chloride of Cinchonine and Mercury.—Dissolve, separately, equal parts of cinchonine and bichloride of mercury in strong alcohol; mix both liquors, and stir them well. After a short time, the whole mass thickens in small needle-shaped crystals. They are first washed with strong alcohol, afterwards with water, and, finally, with ether mixed with water. They are dried afterwards, and, when dry, are almost insoluble in cold water, but easily soluble in warm diluted alcohol.

The analysis of this salt gives the formula,—

$$C_{38}\ H_{11}\ N_2\ O_2 + 2\ H\ Cl + 2\ Hg\ Cl.$$

Chloride of Piperine and Mercury.—Dissolve one part of piperine in strong alcohol, slightly acidulated with muriatic acid; dissolve also two parts of bichloride of mercury in alcohol; mix both solutions, and let them stand for three or four days. Separate the crystals from the mother liquor, wash them in pure alcohol. These crystals, when dry, are dark yellow, beautifully shining and transparent, insoluble in water, and difficult to dissolve in concentrated hydrochloric acid, but easier dissolved in warm alcohol.

The following formula is deduced from its analysis,—

$$C_{70}\ H_{38}\ N_2\ O_{10} + H\ Cl + 2\ Hg\ Cl + 2\ H\ O.$$

Chloride of Morphine and Mercury.—Dissolve hydrochlorate of morphine in water, mix it with a watery solution of bichloride of mercury in excess, and instantly is obtained a white precipitate of silky crystals. They may easily be washed and dried. The analysis shows them to consist of $C_{34}\ H_9\ N\ O_6 + H\ Cl + 4\ Hg\ Cl$.

A FORMULA FOR CONCENTRATED ELDER FLOWER WATER.

Krembs recommends the following process for making a concentrated elder flower water, from which he states the ordinary water can be extemporaneously prepared, of excellent quality, and of uniform strength:— 2 lbs. of the flowers are to be distilled with water until that which passes into the receiver has lost nearly all perfume. This will generally happen when from 15 to 18 pounds have passed over. To the distillate, 2 lbs. of alcohol are to be added, and the mixture distilled until about 5 lbs. are collected. This liquor contains all the odour of the flowers. To make the ordinary water, 2 ounces of the concentrated water are to be added to 10 ounces of distilled water.—*Buchner's Report.*

ON POPPY HEADS.

A QUESTION having arisen among the German pharmaceutists, whether ripe or unripe poppy heads were preferable in making syrups and extracts, Professor Buchner, senior, submitted both to a very careful analysis; the result of which is that ripe poppy heads, that is, those in which the seeds have acquired perfect maturity, are the most preferable, as the proportion of the precipitate obtained by acting upon the infusions of both by iodine, gives, in the proportion, a difference of 100 of the unripe to 158 in favour of ripe poppy heads. According to Buchner, the whole of the alkaloids contained in an aqueous infusion of poppy heads is precipitated by a watery solution of iodine in iodide of potassium. The ripe poppies, freed from the seeds, gave 25 per cent of watery extract. The unripe capsules lost 86 per cent. by weight on drying, and when dry produced 26 per cent of watery extract. The infusions of both kinds are acid to litmus paper, and should be neutralised with ammonia before applying the iodine test.

ON CHINA GALL NUTS.

BY J. A. BUCHNER, SEN.

THIS able chemist has made a vast number of careful experiments to ascertain the comparative value of the Gall Nuts of Aleppo, and those of China. The results of which show that for all pharmaceutical and technical purposes for which this substance is employed, or to extract Tannic or Gallic acid, those imported from China deserve the preference, not only on account of their cheapness, but also on account of their yielding more abundant supply of valuable constituents.

ON DRY EXTRACTS.

BY. DR. MOHR.

EVERY ONE is aware of the utility of possessing dry extracts, particularly of narcotic plants, so as to be able to administer them as powders. This able pharmaceutist gives the following formula; and as it seems to answer all purposes, and is adopted in Berlin, and other continental towns, it deserves to be made public.

Take of any extract, and of powder of licorice equal parts, mix them well in a mortar; when well mixed, put the paste in an earthenware evaporating dish, and then put this vessel over an iron pan, which has been filled with chloride of calcium, previously dried in the vessel by a strong fire without melting: the iron vessel must have a cover to enclose both vessels, so that the chloride of calcium can absorb the vapour from the extract without communication with the air, which must be put on as soon as the extract has been placed on the chloride of calcium. Let it stand for some days. Remove the extract, and add an equal weight of licorice powder to it in a mortar, mix well, and preserve it in bottles.

A NEW FORMULA FOR PHOSPHORUS PASTE, A POISON FOR RATS.

BY DR HÄNLE.

Mix twelve ounces of starch thoroughly, with eight ounces of cold water, and add forty ounces of boiling water. When by stirring the starch, jelly is formed; put into it an ounce and a half of phosphorus, and cover the vessel for a few minutes. Then mix the mass well with a spatula; when cold, add some powdered valerian root, or anise-seed. To preserve the paste, fill some small wide-mouth jars with it, and close the jars carefully to prevent access of air. Dr. Hänle recommends that the paste should be spread on slices of bread, and these placed near holes through which the rats pass, taking care that they are constantly renewed as consumed.

MANSION HOUSE, OLD PARK, *Bristol, January 7th*, 1852.

To the Editors of "The Annals of Pharmacy."

GENTLEMEN,

My attention has been just directed to a communication, by Dr. Sheridan Muspratt, of Liverpool, which appeared in the last number of your journal, on the combination of arsenious acid with albumen; and I must assure you that the perusal of it has caused me much pain. I regret, with you, that so much personal animosity should have arisen from the discussion of a subject of purely scientific interest; indeed, every true lover of science must feel pained when he finds men of undoubted ability, as the celebrated Liverpool chemist, descending from the high positions they occupy, to indulge in personal allusions, such as are to be met with in the communication in question. Such proceedings as these are derogatory to science and its professors, and should certainly be ayoided in such a controversy as the present, which, as you very justly observe, involves a question of no ordinary importance. Not being, even in the slightest degree, acquainted with any of the disputants, I am sure you will acquit me of all party-feeling in the question at issue. I greatly regret having been drawn into the controversy; but as I perceive that some of Dr. Muspratt's remarks tend to throw discredit on the results of my experiments, or at least the deductions from them, I think that, in justice to myself, I ought to offer you a few observations upon the subject of his paper. I will endeavour to confine myself strictly to those portions of his communication which relate more particularly to myself. The author says*: "I will not call into question Mr. Herapath's chemical attainments;" for which forbearance I return him my best thanks, inasmuch as I consider he has thus paid me one of the highest compliments it has ever been my good fortune to receive; for it is clear, from the somewhat uncourteous treatment his other opponents have received at his hands, that it is not out of mere kindness that he "spares the rod." There is one assertion in his letter, however, which I must call your attention to. I am accused of having "evidently taken up the subject to find Liebig wrong+." This, I most unequivocally deny; and I cannot imagine what expression of mine has induced him to draw a so uncharitable conclusion. When I first undertook the investigation of the subject, at the instance of my father, I was strongly prejudiced *in favour* of Liebig's hypothesis, and was only convinced that it was untenable by a long series of experiments, an account of which appeared a few months back in the Philosophical Magazine, and has been thence copied into most of our scientific periodicals. Few persons hold Professor Liebig in higher esteem than I do; but it does not therefore follow, that I should deny myself the right of private judgment; for, although Liebig is admitted by all to be one of the popes of chemical science, Dr. Muspratt must bear in mind, that even *the* Pope is not infallible. Why, therefore, should Baron von Liebig be so? As regards the insinuation, that I have taken up the question merely for the sake of a little notoriety, it is unworthy of a reply. I fight for *truth*, and not for *victory*.

* See page 9. + Ibid.

It would, perhaps, have been better if your correspondent, before commencing this discussion, had recalled to mind the advice of his Christian Master,—"Judge not, lest thou be judged."

In the paper before alluded to, which appears to have called forth that of Professor Muspratt, I concluded the details of my experiments with the following sentence:—"I content myself with relating the facts I have observed, and leave my readers to draw their own conclusions." What proceeding, I ask, could be fairer? We have now both placed our results before the chemical public.—Let the public, then, be the judge between us, and decide as to which of the two is deserving of the most credit. I know that I may, with confidence, leave the decision in their hands.

It is but fair, however, that I should offer them a few observations on the point at issue, and thus remove the false impression which I fear my opponent's remarks have produced on the minds of your readers; and, with your kind permission, I will now do so. Dr. Muspratt, as you are aware, adopting Liebig's hypothesis, asserts, "that arsenious acid combines with albumen in atomic proportions, and forms, with it, a true chemical compound—an arsenite of albumen." For an account of his experiments, which have been brought forward in support of this theory, I must refer your readers to the Journal of the Chemical Society of London*. His opponents, however, contend, that the action is purely mechanical;—that the small quantity of arsenious acid which is abstracted from the solution by the albumen, is enveloped, so to speak, by the latter substance, or condensed upon the surface of its molecules, just in the same manner as the feculencies are abstracted from saccharine syrups in the well-known process of clarification; or as iodine, and certain alkaloids, are separated from their solutions by animal charcoal. Let us see, then, upon what facts, Dr. Muspratt grounds his opinion. In the first place, according to the experiments described in the paper before alluded to, every 100 grains by weight, of the glairy albumen of eggs combine with 0.632 gr. of crystallised arsenious acid. Now, upon referring to Experiment II. in my memoir, it will be found, that when 438.5 gr. of albumen were intimately mixed with 0.25 gr. of arsenious acid,—that is to say, with only about the one-tenth of the quantity mentioned by Dr. Muspratt,—and the mixture was coagulated by heat, evaporated to dryness, and exhausted with boiling water, the filtrate—even that portion, be it remembered, which *first passed through the filter*, and before the "smashing to atoms" process, as it has been called, was commenced—was found to contain a large proportion of arsenic.

In the second place, in order to account for the presence of arsenic in the washings of the coagulate, Dr. Muspratt remarks, "No one ever stated that a perfectly insoluble compound was produced. * * * * Your readers will perceive that Mr. Herapath did everything he could with his mortar, pestle, and hot water, to prove that no compound was formed. Has he proved it? Certainly not. He only shows, *unknowingly*, that, by long trituration and boiling, portions of the firm combination of arsenious acid and albumen are dissolved out." He then proceeds to draw a parallel between the decomposition (?) thus effected and that of plate-glass, when in a state of fine division, by water. Now, every tyro in chemistry knows, that plate-glass is a mixture, or possibly a definite combination, of several earthy and alkaline silicates, some of which are soluble in water, whilst others, on the contrary, are almost, if not totally, insoluble in that menstruum. When, therefore, such a compound is digested in water for a long period of time, the natural effect is, that minute quantities of the former are dissolved out. I contend, however, that the two cases do not bear the slightest resemblance to each other, and, therefore, that the reasoning is illogical. The same remark applies to the other examples cited; namely, the solubility of sulphate of lime and sulphate of lead in water. Dr. Muspratt should bear in mind that *solution* is not *decomposition*.

Now, that the arsenite of albumen or albuminate of arsenious acid (if such a compound *does* exist), is decomposed by boiling water, I consider is clearly demonstrated by my experiments, and also *by those of one of his supporters*, Mr. R. W. Forster, of Whitehaven. If the correctness of these results is not disputed, then, I ask, what reliance is to be placed on the statement, as regards the almost indestructibility of the compound referred to? In a paper which appeared in the first volume

* See page 179 of the last volume.

(N. S.) of the "Chemist," Dr. Muspratt makes the following remarks:—"Why cannot arsenic be detected in the animal tissues? Because, by experiment, we have found that it has become an integral part of those tissues, and is held in combination by a stronger affinity than those substances which are applied to ascertain its presence, have power to overcome. It is in the tissue, like iron in ferrocyanide of potassium*." With respect to the other arguments brought forward, they prove nothing. We are told that sulphate of albumen is somewhat *soluble* in water, and may be *decomposed* by carbonate of ammonia. Why? Because the sulphuric acid possesses a stronger affinity for the oxide of ammonium than for the albumen. It is a simple case of elective affinity, and, like those before alluded to, offers no parallel to the case in point. Berzelius, in treating of this compound of sulphuric acid and albumen, remarks, "Even after continued washing, sulphuric acid and albumen may be detected in the coagulum." But, it must be remembered, that in my experiments, only *exceedingly minute traces* of arsenic could be detected in the coagulate, after the latter had been treated with hot water; whereas, if the arsenical compound is as stable as has been asserted, I am sure your readers will agree with me when I say, that the residue ought still to have consisted of arsenite of albumen, instead of nearly pure albumen, which was found.

The presence of the minute traces of arsenious acid, in the residuary matter, upon which so much stress has been laid, may be readily accounted for. It is unnecessary to point out to a chemist of Dr. Muspratt's experience, the almost impossibility of removing the last traces of a foreign body, even from a simple inorganic precipitate, alumina or sulphate of baryta, for instance; and, of course, this remark is still more applicable to an albuminous coagulum, where the contaminating ingredient is enveloped, so to speak, in an almost impenetrable covering.

These few remarks will, doubtless, suffice to point out to your readers the validity of my opponent's line of argument. There is one fact related in my paper, however, which, strange to say, that gentleman does not even allude to; namely, the one having reference to the action of the so-called arsenite of albumen on the animal economy. He surely will not accuse the poor cat of being so violently opposed to Liebig's theory, as to die on purpose to spite that great man? The idea is absurd. But no; this point, the Doctor skips over altogether. Perhaps he will kindly inform your readers why he does so. This fact, in my opinion, is worth a whole host of theories or hypotheses; and unless my opponent can convict the animal referred to of having wilfully destroyed itself, I contend that all doubt as to the poisonous character of the arsenite of albumen, (?) is completely dispelled. The compound in question, according to Muspratt, is "not poisonous."

I am glad to see, however, that we may shortly expect a complete chemical examination of the albuminates. I anxiously await the result. I quite agree with Professor Muspratt when he says, that such questions as the present demand "not merely broad assertions, unsupported by *data*, but carefully conducted experiments, and well-grounded facts."

I remain, Gentlemen, your obedient Servant,

THORNTON J. HERAPATH.

42, Berry Street, Liverpool, *January 13th*, 1852.

To the Editors of "The Annals of Pharmacy and Practical Chemistry."

Gentlemen,

In reply to the Editorial Note, contained in page 11 of your new Periodical, inviting a discussion on the subject of Professor Liebig's Theory on Arsenical Poisoning, I much regret that the extremely personal and offensive character of the article by your correspondent, Dr. Muspratt, utterly precludes my noticing his objections to my views on the subject, which have been already published and confirmed by the results and opinions of more experienced chemists than myself. Should you, however, be desirous of laying the subject before your readers, I beg to suggest the re-publication of my experiments on the subject; and should you, or any correspondent capable of conducting such an inquiry in a gentlemanly and philosophic spirit, be disposed to criticise the paper, I shall be very happy to furnish

* See page 128.

you with a fuller investigation of my views and arguments on this subject, which I certainly deem neither an uninteresting nor unimportant one.

I am, GENTLEMEN, yours faithfully,
JOHN B. EDWARDS, F.C.S.
Teacher of Practical Pharmacy to the Liverpool Chemists' Association.

PUTNEY, *January 5th*, 1852.

To the Editors of "The Annals of Pharmacy, &c."

GENTLEMEN,

My attention has been drawn to a review of *Phillips' Translation of the Pharmacopœia Londinensis*, in the first number of your journal.

Permit me to explain the mistake you have fallen into, when commenting on the remarks on Potassio-tartrate of Iron, contained in that translation.

This has arisen from your having assumed that the symbolical formula of a compound necessarily represents its equivalent or combining weight, and usually it does so, but by no means constantly, as in the instance before us,—an exception particularly pointed out in the "Explanation of the mode of employing Symbols and Formulæ," (p. 535) of *Phillips' Translation.* "The equivalent of a sesquisalt or compound is always one-half of the sum of the equivalents of its formula. . . . . Again, sesquioxide of iron is written $Fe_2\ O_3 = 80$; but its equivalent is 40, or one-half the equivalent deducible from its formula." Apply this salt to the formula given for tristartrate of sesquioxide of iron, $3\ Fe_2\ O_3$, $2\ C_4\ H_2\ O_5 = 372$, —the one-half of which will be $186 + K\ O$, $C_4\ H_2\ O_5 = 114 + 6\ H\ O$, $= 54 = 353$, or—

One equivalent of tartrate of potash, ...	114
One equivalent of tristartrate of sesquioxide of iron, composed of three equivalents of sesquioxide of iron and one equivalent of tartaric acid, ...	186
Six equivalents of water, ...	54
Equivalent, ...	354

and—

$$354 : 120 :: 100 : 33{\cdot}9\ Fe_2\ O_3;$$

a close approximation to the 34 per cent. of sesquioxide of iron stated by the College of Physicians to exist in their preparation.

Your own rendering of the formula, ($3\ Fe_2\ O_3$, $2\ C_4\ H_2\ O_5$,) "One equivalent of tristartrate of the sesquioxide of iron, composed of three equivalents of sesquioxide of iron and two equivalents of tartaric acid," is surely incompatible with its being a *tristartrate;* a compound consisting of *three* equivalents of one constituent, and *two* equivalents of the other, is necessarily a *sesqui*, not a *tri*-salt.

Soubeiran's salt evidently differs in some respect from that of the London College: nor am I aware of any experiments that show this salt to be anhydrous, although it is doubtless the case, that desiccation cannot be pushed beyond certain limits, without decomposing the salt; but this is no proof that it is anhydrous.

A careful determination of the proportion of the tartaric acid, oxide of iron and potash contained in the salt made according to the directions of the College, would settle the point, and be highly interesting to pharmaceutists.

The definite aim and moderate tone of your new Journal claim respect, and, I should hope, will eventually ensure success.

I remain, GENTLEMEN, yours obediently,
J. DENHAM SMITH.

[We willingly publish Mr. Denham Smith's letter, so that our readers may do justice between us. Lest they should think that we admit the charge that Mr. Smith has laid against our review, we must make a few remarks, although we feel no desire to have the last word.

We do not (notwithstanding the name) hold that the sesquioxide of iron is an exception to the general rule, "that the symbolical formula of a compound necessarily represents its equivalent or combining weight." All the authorities that we have consulted regard the equivalent of the per or sesquioxide of iron as 80, and its formula as $Fe_2\ O_3$; and, moreover, Mr. Smith maintains this view of the matter at issue himself, as the following passage will prove. Speaking of the oxides of iron, he says:—

'Of these, the first two combine," (*i.e.*, the protoxide and sesquioxide of iron,) " to form a definite compound, crystallizing in octohedrons, and *consisting of an equivalent of each*, which has been termed the black or magnetic oxide of iron, and is composed of—

3 equivalents of iron, $28 \times 3 = 84$
4 „ „ oxygen, $8 \times 4 = 32$ } Magnetic oxide 116, FeO, Fe_2O_3."

——Page 287, *Phillips's translation.*

In this passage the author refutes himself the accusation he has made against us; for he observes, that this magnetic oxide consists of an equivalent of each of the oxides, and that its equivalent is 116. Now he will agree with us, that the equivalent of protoxide is 36; consequently the equivalent of sesquioxide must be, according to his own statement, 80, and not 40; or the equivalent of magnetic oxide he should have written 76, and not 116, as he has calculated it in the above quotation. However, we must do Mr. Smith the justice to say that he again contradicts, unconsciously, his view of the combining weight of sesquioxide of iron, in his remarks about the constitution of magnetic oxide of iron, at page 534 of this translation; for he there observes, that " the black or magnetic oxide of iron consists of one equivalent of oxide and two equivalents of sesquioxide of iron."

For the sake of argument, were we to grant that Mr. Smith is right about the equivalent of sesquioxide of iron, he cannot escape from the other horn of the dilemma, which was presented to him by our review,—namely, that he has, without any data derived from experimental inquiry, assumed that potassio-tartrate of iron contains six equivalents of water,—especially when all who have examined this salt have pronounced it to be anhydrous.——*Editors of " The Annals of Pharmacy."*]

TO CORRESPONDENTS.

Q., Uxbridge.—We did not notice the first point alluded to, because the subject has been worn threadbare by other journals; the second one shall receive an early attention. We are nevertheless obliged by your letter.

H. Hyett, Leicester.—The word " chemical " was originally used only as an adjective, but by a modern perversion of terms it is used also as a substantive; therefore it is only in the latter and perverted sense that sulphur can be considered as a chemical.

Nemo, Jersey.—No Pharmacy Bill will interfere with the privileges of any chemist embarking in business, if only one hour before it receives the assent of Parliament.

Σ.—We cannot insert your communication, because of its purely personal character.

L. R. S., Manchester.—For essence of pine apple, see page 43 of the present Number. Essence of jargonelle pear is made by distilling a mixture of one part each Fusel oil and sulphuric acid, with two parts of acetate of potash. The distillate is purified by potash and chloride of calcium, and by re-distillation from protoxide of lead.

Steph., Brighton.—Try the following: Mix, by weight, 1 part of strong liquor ammoniæ, 2 parts of nitrate of silver, 3 parts each of water and alcohol. Filter, and add to clear liquid ¼ part of grape sugar, previously dissolved in a little weak spirit. This liquid, when warmed, deposits silver on the surface of glass.

Mr. Cross, Bath.—There is only too much truth in your letter for us to give it publicity, although we are not prone to sacrifice truth to politeness.

Quid Pro Quo.—Pay your subscription once more, as vigorous efforts are being made to place things on a foundation more favourable to the members. This year will decide whether cupidity or justice is to have the sway.

An Associate.—1. Send your communication to us. 2. Apply to the Secretary. 3. The ungentlemanly demeanour of some persons at the first and second evening meetings, from whose positions and years the exhibition of such puerile ebullitions of paltry feelings could not but have excited surprise, is no doubt the cause of their discontinuance, as neither members nor associates will place themselves in the dilemma of being snubbed or derided.

M. P. S.—We cannot explain why Professor Redwood's translation has not appeared, or when it will. Apply to his publisher. Squire's will meet your wishes.

Other correspondents answered by post.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG,

Professor of Chemistry at the University of Giessen.

No. II.

Of Pharmaceutical Preparations in general.

VERY few drugs can be exhibited for medicinal purposes without undergoing some preparation by which either their form or composition is altered; sometimes we are obliged to mix several bodies together, at other times we are compelled to separate mixed bodies into their different components. The operations required to attain this object are called Pharmaceutical operations. Drugs which are intended to be exhibited as medicines are prepared in laboratories; the mixing up of medicines is performed in the chemist's shop.

The legal prescriptions contained in pharmacopœias or dispensatories are called official formulæ; the prescriptions of physicians for the exhibition of particular medicines are called magistral formulæ.

Pharmaceutical operations are divided into mechanical or galenic, and chemical. The object of the first is a division of the homogeneous part of bodies, or a separation of their different components, separation of different visible parts, or a mixing up of different bodies. The object of chemical operations is the production of new compounds, or the analysis of compound bodies. It is, however, difficult to separate exactly the two operations; as, in some instances, different bodies can not be mixed without forming new compounds; nevertheless, we shall be obliged to reckon among mechanical operations all those in which chemical combinations do not constitute the principal object.

Of Mechanical Operations, and the necessary Instruments.

Separation of Bodies.

Cutting is a mechanical operation by which roots, herbs, flowers, are divided in more or less minute parts. To cut hard roots and woods a root-knife is employed. A long straight knife, with a wooden handle, fastened at the end to a board by means of a ring; the roots are placed on the board under the knife. It acts both as a wedge and as a lever,

and if of a proper length it will cut well. Several forms of this knife are described in French and German pharmaceutical journals. Herbs and roots of moderate hardness are cut with the rocking-knife, which is made of a semicircular-shaped blade, having a handle at each end: by rocking the knife on the herbs placed on a board, they are easily cut into small pieces. Some employ for the same purpose strong scissors.

In order to obtain particles of the same size it is necessary to separate the coarser from the finer by means of sifting. For this purpose sieves are employed, made of iron or brass wire. The coarser particles are cut anew. The holes of these sieves are from one to three lines in diameter. Instead of the iron-wire sieves, the Spanish wooden may be employed, though less lasting When all has been uniformly cut, the herbs are placed in a fine sieve to remove the dusty particles. Horns, bones, and hard woods and fruits, are reduced to a state of a coarse powder by rasping. The divided substances are called rasura.

Softer substances, fresh herbs and roots, are reduced to a pulpy mass (*conquassare*) by means of the pestle and mortar, or by a grater or sieve.

Pulverization (*contusio*), trituration (*trituratio*), are the means employed to reduce hard dry substances into powders of different degrees of fineness. The instruments required are the pestle and mortar, and the trituration board and muller.

The more dry the substances are, the easier they are reduced to powder. Bodies which attract easily moisture from the air, such as roots, herbs, and flowers, must be exposed to artificial heat before pounding them. Aromatic herbs and flowers require but moderate heat; and the operation must be performed quickly, else they lose their aroma. On the other hand, nux vomica can only be pulverized after having been dried in an oven. Some substances are always soft at common temperature, and cannot be dried by heat without altering their properties, but become brittle when exposed to frost; for instance, assafœtida, galbanum, and ammoniacum. These substances ought to be pulverized in water. Other bodies, such as colocynthis, can only be reduced to powder after having been previously impregnated with some drying mucilage or gum; for which purpose they are bruised in a mortar with some mucilage, and afterwards dried. Substances thus prepared were called formerly trochisci, for example, trochisci alhandal, trochisci agarici. Some metals which are fire-proof, and insoluble in water, previous to their pulverization, are made red hot and cooled in water. Mortars are commonly of cast-iron or brass; the brass ones are only fit for less hard substances, and for such which do not easily attack the metal. Iron mortars are the best, both on account of their hardness and safety. In large pharmacies, the pestle is suspended by means of a cord to elastic beams, or several mortars are put at work at once by a steam-engine. To prevent the finer parts flying off during the process of pounding, the mortar is fitted with a wooden cover, perforated to admit the pestle; this object is still easier attained by tying round the mortar and the pestle a pliable piece of leather. Yet, notwithstanding these precautions, if euphorbium, veratrium, and similar substances are pounded, it is necessary for those employed in this operation to cover their faces with masks made of sponge, dipped in water, and tied behind the ears by a string.

But woods, barks, and hard substances are better reduced to powder at proper drug-mills, such as exist in England.

To obtain powders of constant equal fineness, it is necessary to employ sieves made of different tissues, such as horsehair, gauze, silk, &c.

Sieves should have a cover, and a receiver with a bottom of parchment or leather, so as to prevent any loss of the powder. For aromatic substances and poisons separate sieves should be employed, as always some particles will adhere to them.

Substances which act or are acted upon by iron are safely pounded in stone mortars, in deep or flat mortars of Wedgwood ware, china, glass, and agate; flat mortars are most commonly employed for triturating small bodies.

Levigation is a process by which substances insoluble in water, chiefly metallic, are reduced to powder. The substance to be levigated is spread, coarsely pounded, and wetted with water, upon a flat table of porphyry or marble, and is there to be rubbed by a conical muller of the same material, till reduced to a paste, which is made into small cones and dried. However, he who possesses fine sieves of gauze, may, in many cases, avoid the process of levigation. Powders are distinguished according to the degrees of fineness, namely: coarse powder (*pulvis grossus*), which may contain particles of half a line dimension; common powder (*pulvis*), which must be fine and equal to the touch, yet the eye may discover the particles of which it is composed. Fine powder (*pulvis subtilissimus*) must be reduced to impalpable dust. The coarser particles which remain in the sieve after are called remanens. Of some substances remanens are still valuable, as the coarser particles can be pounded over again; but of herbs which have hard stocks, and woods with wooden fibres, the remanens must be thrown away. Powders of organic substances must be kept in close vessels; those which are aromatic must be pressed very closely, and they will keep longer and better than the substances from which they are derived.

Metals which cannot be pounded are reduced to powder by filing. These filings are of different degrees of fineness according to the files employed, and some, as that of iron, made by means of fine English files, and almost as well levigated as the finest powder, and is called limaturæ ferri. Some are beaten on an anvil to very thin foils. Metals which are easily fused are melted first, thrown afterwards in wooden boxes lined with pipe-clay, and shaken till by cooling they are transformed in small grains (*granulatæ*). Other metals, for instance tin, may be also pulverized, by throwing them melted in a hot iron mortar, and rubbing them briskly with the pestle. The powder is sifted through a sieve, and the remanens melted again, and triturated as before.

FORMULA FOR THE PREPARATION OF RUM-ETHER.

Take of black oxide of manganese, of sulphuric acid, each twelve pounds; of alcohol, twenty-six pounds; of strong acetic acid, ten pounds. Mix, and distil twelve pints. The ether as above prepared is an article of commerce in Austria, being the body to which rum owes its peculiar flavour.——*Austrian Journal of Pharmacy.*

ON THE APPLICATION OF ORGANIC CHEMISTRY TO PERFUMERY.

BY DR. A. W. HOFMANN.

Professor to the Royal College of Chemistry, London.

Cahours' excellent researches concerning the essential oil of gaultheria procumbens (a North American plant of the natural order of the Ericinæ of Jussieu), which admits of so many applications in perfumery, have opened a new field in this branch of industry. The introduction of this oil among compound ethers must necessarily direct the attention of perfumers towards this important branch of compounds, the number of which is daily increasing by the labours of those who apply themselves to organic chemistry. The striking similarity of the smell of these ethers to that of fruit had not escaped the observation of chemistry; however, it was reserved to practical men to discover by which choice and combinations it might be possible to imitate the scent of peculiar fruits to such a nicety, that makes it probable that the scent of the fruit is owing to a natural combination identical to that produced by art; so much so, as to enable the chemist to produce from fruits the said combinations, provided he could have at his disposal a sufficient quantity to operate upon. The manufacture of artificial aromatic oils for the purpose of perfumery is, of course, a recent branch of industry; nevertheless, it has already fallen into the hands of several distillers, who produce sufficient quantity to supply the trade; a fact, which has not escaped the observation of the Jury at the London Exhibition. In visiting the stalls of English and French perfumers at the Crystal Palace, we found a great variety of these chemical perfumes, the applications of which were at the same time practically illustrated by confectionery flavoured by them. However, as most of the samples of the oils sent to the Exhibition were but small, I was prevented, in many cases, from making an accurate analysis of them. The largest samples were those of a compound labelled "Pear oil," which, by analysis, I discovered to be an alcoholic solution of pure acetate of amyloxide. Not having sufficient quantity to purify it for combustion, I dissolved it with potash, by which free fusel oil was separated, and determined the acetic acid in the form of a silver salt.

0,3080 gram. of silver salt = 0,1997 gram. of silver.

The per centage of silver in acetate of silver is, according to

Theory.	Experiment.
64,68	64,55.

The acetate of amyloxide which, according to the usual way of preparing it, represents one part sulphuric acid, one part fusel oil, and two parts of acetate of potash, had a striking smell of fruit, but it acquired the pleasant flavour of the jargonelle pear only after having been diluted with six times its volume of spirit of wine.

Upon further inquiry I learned that considerable quantities of this oil are manufactured by some distillers, from fifteen to twenty pounds

weekly, and sold to confectioners, who employ it chiefly in flavouring pear-drops, which are nothing else but barley-sugar, flavoured with this oil.

I found, besides the pear-oil, also an *apple-oil*, which, according to my analysis, is nothing but valerianate of amyloxide. Every one must recollect the insupportable smell of rotten apples which fills the laboratory whilst making valerianic acid. By operating upon this raw distillate produced with diluted potash, valerianic acid is removed, and an ether remains behind which, diluted in five or six times its volume of spirits of wine, is possessed of the most pleasant flavour of apples.

The essential oil most abundant in the Exhibition was the pine-apple oil, which, as you well know, is nothing else but the butyrate of ethyl-oxide. Even in this combination, like in the former, the pleasant flavour or scent is only attained by diluting the ether with alcohol. The butyric ether which is employed in Germany to flavour bad rum, is employed in England to flavour an acidulated drink called pine-apple ale. For this purpose they generally do not employ pure butyric acid, but a product obtained by saponification of butter, and subsequent distillation of the soap with concentrated sulphuric acid and alcohol; which product contains, besides the butyric ether, other ethers, but nevertheless can be used for flavouring spirits. The sample I analyzed was purer, and appeared to have been made with pure butyric ether.

Decomposed with potash and changed into silver salt, it gave

0,4404 gram. of silver salt = 0,2437 gram. of silver.

The per centage of silver in the butyrate of silver is according to

Theory.	Experiment.
55,38	55,33.

Both English and French exhibitors have also sent samples of cognac-oil and grape-oil, which are employed to flavour the common sorts of brandy. As these samples were very small, I was prevented from making an accurate analysis. However, I am certain that the grape-oil is a combination of amyl, diluted with much alcohol; since, when acted upon with concentrated sulphuric acid, and the oil freed from alcohol by washing it with water, it gave amylsulphuric acid, which was identified by the analysis of the salt of barytes.

1,2690 gram. of amylsulphate of barytes gave 0,5825 gram. of sulphate of barytes. This corresponds to 45,82 per cent. of sulphate of barytes.

Amylsulphate of barytes, crystallized with two equivalents of water, contains, according to the analysis of Cahours and Kekule, 45,95 per cent. of sulphate of barytes. It is curious to find here a body, which, on account of its noxious smell, is removed with great care from spirituous liquors, to be applied under a different form for the purpose of imparting to them a pleasant flavour.

I must needs here also mention the artificial oil of bitter almonds. When Mitscherlich, in the year 1834, discovered the nitrobenzol, he would not have dreamed that this product would be manufactured for the purpose of perfumery, and, after twenty years, appear in fine labelled samples at the London Exhibition. It is true that, even at the time

of the discovery of nitrobenzol, he pointed out the striking similarity of its smell to that of the oil of bitter almonds. However, at that time, the only known sources for obtaining this body were the compressed gases and the distillation of benzoic acid, consequently the enormity of its price banished any idea of employing benzol as a substitute for oil of bitter almonds. However, in the year 1845, I succeeded by means of the anilin-reaction in ascertaining the existence of benzol in common coal-tar-oil; and, in the year 1849, C. B. Mansfield proved, by careful experiments, that benzol can be won without difficulty in great quantity from coal-tar-oil. In his essay, which contains many interesting details about the practical use of benzol, he speaks likewise of the possibility of soon obtaining sweet scented nitrobenzol in great quantity. The Exhibition has proved that this observation has not been left unnoticed by the perfumers. Among French perfumeries we have found, under the name of artificial oil of bitter almonds, and under the still more poetical name of "essence de mirbane," several samples of essential oils, which are no more nor less than nitrobenzol. I was not able to obtain accurate details about the extent of this branch of manufacture, which seems to be of some importance. In London, this article is manufactured with success. The apparatus employed is that of Mansfield, which is very simple: it consists of a large glass worm, the upper extremity of which divides in two branches or tubes, which are provided with funnels. Through one of these funnels passes a stream of concentrated nitric acid; the other is destined as a receiver of benzol, which, for this purpose, requires not to be quite pure; at the angle from where the two tubes branch out, the two bodies meet together, and instantly the chemical combination takes place, which cools sufficiently by passing through the glass worm. The product is afterwards washed with water, and some diluted solution of carbonate of soda; it is then ready for use. Notwithstanding the great physical similarity between nitrobenzol and oil of bitter almonds, there is yet a slight difference in smell which can be detected by an experienced nose. However, nitrobenzol is very useful in scenting soap, and might be employed with great advantage by confectioners and cooks, particularly on account of its safety, being entirely free from prussic acid.

There were, besides the above, several other artificial oils; they all, however, were more or less complicated, and in so small quantities, that it was impossible to ascertain their exact nature, and it was doubtful whether they had the same origin as the former.

The application of organic chemistry to perfumery is quite new; it is probable that the study of all the ethers or etherial combinations already known, and of those which the ingenuity of the chemist is daily discovering, will enlarge the sphere of their practical applications. The caprylethers lately discovered by Bouis are remarkable for their aromatic smells (the acetate of capryloxide is possessed of the most intense and pleasant smell), and they promise a large harvest to the manufacturers of perfumes.——*Annalen der Chemie.*

PHARMACEUTICAL PREPARATIONS OF GOLD.

Gold was introduced into the materia medica by the Arabian physician, Ebn Sina, and his disciples; after him by the great pioneer of chemistry, Theophrastus Paracelsus; in the sixteenth and seventeenth century gold was considered a most valuable remedy:—"For gold in physick is a cordial," said Chaucer in his "Canterbury Tales."

The preparations of gold then most in vogue are to be found among others, in Zwelfer's "Pharmacopœia Regia" (1668), in the "Pharmacopœia Universalis" of Dr. Schröder (1672), also in Murray's "Apparatus," concluded after his death by F. Gmelin (1795). According to the pharmaceutical theory of those times, it was thought that gold, being, on account of its physical and chemical properties, the most noble metal, must needs possess most wonderful medicinal properties, an opinion which was also strengthened by astrological reveries, the sun being its symbol. Hence it was taken for granted that gold was not only a tonic, but an elixir of life, a comforter of the spirit, a purifier of the blood, a sudorific, and expeller of vitiated fluids. Hence it was prescribed against nervous debility, spasms, hypochondriasis, epilepsy, syphilis, and different other diseases.

The number of gold preparations which by degrees swelled the pharmacopœias was not small. Leaf gold was used, not only to gild pills, but formed also an ingredient of several powders; for instance, pulvis aureus cellensis, pulvis cardiams gaubii, pulvis marchionis. Metallic gold reduced in fine powder was also esteemed a remedy of great value. Still more important for medicinal purposes was the fulminating gold, aurum fulminans, obtained by precipitating gold dissolved in aqua regia, by means of solution of carbonate of ammonia.

According to another formula, the solution of gold in nitro-muriatic acid was precipitated by a solution of caustic potash; in which case, however, the precipitate thus obtained was not fulminating gold, but oxide of gold, a preparation which, however, might be changed easily into fulminating gold if exposed to a current of ammoniacal gas.

The question is, whether these two preparations of gold have the property of entering in combination with protein?

The old pharmacopœia of Würtemberg, which prescribes the employment of liquid ammonia in the preparation of fulminating gold, states that this medicine acts as a powerful purgative, particularly if acid humours are in the prima viâ, and must be administered with caution, as it causes oppression. The excrements which follow the administration of gold in the dose of from 1 to 5 grains, are black. However, this medicine, which in some cases acts as a purgative, acts in others as a diaphoretic. These are facts which cannot be denied upon theoretical principles.

Another preparation, called magisterium auri, or magisterium chrysopurpuræ, appears to have been either fulminating gold, or oxide of gold, prepared in different ways. In fact, the formulæ of several preparations of gold formerly in use are so ambiguous, that it would be worth the while to subject them to a new examination. Such, for instance, is the aurum diaphoreticum. The formula given for its prepar-

ation in the "Dispensatorium Pharmaceuticum Austro Viennense" of 1744, is very curious. It prescribes to melt gold and antimony in a crucible, to pulverize this mixture, add to the powder muriate of soda, and subject it three times to a long calcination and washing, after which the powder is taken out, dried, put in a cup with spirit of wine, and the spirit of wine burned. Probably, this protracted and repeated calcination and washing had the effect of oxidizing the antimony, and to wash out the muriate of soda. The question is, whether the antimony remains behind united to the gold, in the same way that tin does in the preparation of purple of cassius. The diaphoreticum solare is, perhaps, the same, or a similar preparation. On the other hand, the aurum diaphoreticum Poterii, which was so much extolled against podagra, is quite a different preparation. "Petri Poterii Pharmacopœia Spagirica Colonia," 1624, gives the following process :—Take fine powdered gold or gold-leaf, and mix it with six or eight times its weight of quicksilver, add to it muriate of soda, and place it in a crucible on a moderate fire, to drive off the mercury, and to cause the gold to remain behind with the salt as a fine powder: the salt is subsequently washed out with water. Paracelsus has also prepared his gold powder by means of an amalgam with mercury, with the idea of fixing the mercury with gold. The same "Dispensatorium Viennense" gives also three formulæ for preparing crocus auri, saffron of gold, one of which being a soluble combination of gold, sulphur, and potash, must have been very useful, and seems to bear great similarity to the aurum potabile of Stahl. The common gold drops, aurum potabile, were a solution of chloride of gold in ether. Another singular preparation which was extolled both as tonic and sudorific against podagra, scurvy, syphilis, and which appears to be much similar to the aurum diaphoreticum, was called bezoardicum solare, and was obtained by calcination of gold and antimony, burning with nitre, and washing with water.

Several other preparations of gold are mentioned in old pharmacopœias and chemical works, such as aurum vitæ, gold of life; aurum essensificatum, essential gold; elixir auri, elixir of gold; oleum solis, sun's oil; aurum balsamicum, balsamic oil; tinctura auri, tincture of gold. However, as the efficacy of the preparations of gold was then questionable, and the price asked for them enormous, gold became obsolete as a medicine, until lately, when Chrestein of Montpellier began anew to introduce preparations of gold in the treatment of scrofulous, syphilitical, mercurial, and other disorders. The preparations now resorted to are the oxide of gold, the double compound of gold and muriate of soda, and the stannate of gold or purple of cassius.

These remarks were suggested by the publication of experiments lately, by Dr. Wittcke, who already, in the year 1841, has tried the beneficial action of aurum præcipitatum in the treatment of rheumatism of the heart. Since that epoch he has administered frequently both the precipitated gold and the diaphoretic gold of Poterius. The formula adopted by Wittcke in exhibiting gold is six grains of poterius diaphoretic powder, mixed with fifty-four grains of sugar of milk, which we think a better vehicle than orrice-root or club-moss powder.——*Buchner's Repertorium.*

ADULTERATION OF BREAD.

BY GEORGE READ,

Manager of the Hot-water Oven Biscuit-baking Company.

The familiar phrase of our countrymen a few years since, when the startling revelations of Mr. Accum were published to the world, as to the extent that food was then adulterated, was, "Death in the pot." The same phrase may be said with propriety to have become an "household word" among the people, in consequence of the extraordinary statements given by Dr. Hassal, in the *Lancet*, as to the extent of sophistication practised with what comprises some portion or other of our morning, noon, and evening meals, the principal part of which, in fact, is bread. On this subject I will beg to solicit a little space in your excellent Journal, to make a few observations, as a "practical man," and one who presumes to know what it is to make bread, as well as to eat it. So far as the matter has been treated by Dr. Hassal and others, it has been what I consider treated theoretically; with your permission I will endeavour to do so practically, so far as the statements published in the *Lancet* will permit of my doing, with interest to your readers.

It was truly remarked in the first number of the "Annals of Pharmacy," "To assert that Dr. Hassal has never arrived at an erroneous conclusion in his investigations, would be to ascribe to him something more than human." Believing it to be the case that he has in some measure "arrived at an erroneous conclusion," I have ventured, on this occasion, to lay my opinion on the matter before your readers, hoping by so doing, that error, if any, may be corrected.

The Adulteration of Bread with Rice-Flour is not, as stated in the *Lancet*, "frequently practised," but only occasionally, and then for the purpose of *introducing into the bread* a substance capable of absorbing and retaining a larger amount of water than it otherwise would do, in order to supply the public with a cheaper loaf than could otherwise be done. Microscopic observations would fail in detecting the starch corpuscles of rice in bread, because they are gelatinized by the action of boiling water before being added to it, unless the operation has been badly performed.

The Adulteraton with boiled and mashed Potatoes, it is stated in the *Lancet* report, "may be readily detected by means of the microscope." If so, how was it Dr. Hassal failed to do so in any one specimen of the bread he examined? The inducement bakers have to use large quantities of potatoes in making bread, he states, is this: "When the cost of flour was double what it now is, the inducement to mix it with a substance, for which not half the amount was charged, was very great; at the same time, however, the difference in value between potatoes and flour is less considerable, and the same induce-

ment does not exist to the employment of potatoes in the manufacture of bread."

I was somewhat surprised at reading such a statement, coming, as I am led to suppose, from the pen of a practical chemist, who draws his conclusions *only* from *strict investigation*, and not from the commonly received opinion ; but Dr. Hassal is not the only chemist I have known make such an assertion without proof.

Potatoes are composed chiefly of starch, water, and fibre, besides skin, and a small portion of saline, mucilagenous, and other matter. Wheat-flour owes its property of making the lightest and most nutritious bread, to the large amount of gluten it contains above every other grain.

By adding large quantities of potatoes, which would consist of principally starch and fibre, the expansive property of the flour would be destroyed and heavy bread the result, precisely the same as if it had been made of barley or oat-flour, in which this principle is deficient.

It is admitted by all who have analyzed the potato, that it contains about 70 per cent. of water, which would be nearly all evaporated by the cooking of them and the baking of the bread ; so that by taking into consideration the loss from evaporation, and what there will be adhering to skins and consequently wasted, there would not be above 25 per cent. of solid matter left. About twenty-eight pounds to a batch of bread containing a sack and a half of flour, is the largest amount used by the bakers, and generally only half that quantity of potatoes is used ; it will therefore be readily seen that they have no inducement to use this tuber for the purpose of adulteration, and also because it does not contain any substance that is capable of absorbing and retaining a large quantity of water like the gluten of flour.

Potatoes are used by bakers for the purpose of, what I call, making potato yeast, but they call it " ferment." For this purpose, the potatoes are first boiled, then mashed and mixed with water at the desired temperature, and with a small portion of flour and the requisite quantity of yeast to raise the bread. In this process, the already ruptured starch corpuscles of the potatoes are acted on by the diastase of the yeast, and converted, by its action, into grape sugar by the time the bread is put into the oven ; if any remain, they are in some small lumps that have not been perfectly mashed and mixed with the liquor (water) used in the first place, which may then be readily detected by the microscope. Let any one try what increase of weight he will have by using potatoes, and he will find it not more, if as much, as the weight of the *boiled* potatoes added.

Adulteration with Alum.—The report in the *Lancet* states, " that alum is in no way necessary, is clearly proved by the excellent quality of bread, as for example, home-made bread, made without a particle of that article being used."

This argument may be all very well with some, but it does not always follow that home-made bread is invariably good when made without alum, and I have known it to be otherwise.

On this point there is a great field for the exercise of skill and

research of your particular class of readers, to determine what harmless substance may be used as a substitute for it, so that flour, under certain conditions, may be made into good bread.

To assert that alum, or something equivalent to it, is not necessary in the manufacture of bread, is to assert that which years of experience has proved to be without foundation, upon which any one may satisfy himself if he will take the trouble to test by practice, and to examine, as I have done, the evidence given before Committees of the House of Commons by scientific men and others, at the close of the last and commencement of the present century. These and other papers respecting it may be found in the British Museum.

Were it not for the practice bakers have of using alum with inferior flour, or when the bakers do not use it, for the millers to add it, a very large portion of that kind sent into the market could not be used for making bread, and those who hoard their corn or flour until it is spoiled, rather than part with it for less than their cupidity demands, would have it returned to them as unsaleable if this practice were discontinued; and its discontinuance would be the means of teaching them a salutary lesson for the future.

In bad seasons, good bread cannot be made without it; and in favourable seasons, if the time of harvesting has been very bad, with difficulty even then. From what I have been enabled to gather from old records, it is from this necessity, that the practice has grown into general use with bakers. In ordinary cases, if any considerable quantity of alum is used, the colour and texture of the bread would be materially injured instead of improved What the *modus operandi* is that alum exerts in the manufacture of bread, I am not prepared to state, beyond that, in *small* doses it bleaches or whitens bread made from inferior flour, and acts as a binding quality as well, so much so, that bakers generally consider two ounces of this salt equivalent to four of muriate of soda. I am also inclined to believe that it acts in some measure as a preventive to the putrefactive fermentation, which takes place in bread under certain conditions; but the determination of this point I will leave to your more skilful and intelligent readers, as I am not sufficiently initiated into the science of chemistry to take upon myself a positive opinion on the matter.

The use of Salt in the manufacture of bread is not for the purpose of adulteration, and no baker, I will venture to say, knew, until it was published in the *Lancet*, that it had any tendency to enable the bread to hold more water, or to whiten the flour. It is necessary to be used in more or less quantity in the manufacture of bread, according to the nature of the flour, not only for the purpose of seasoning, so as to give savour to the bread, but also to prevent a too rapid and "fretful" fermentation in certain states of the atmosphere, and to enable the baker to separate the loaves one from the other fairly when he "draws" them from the oven, as well as afterwards. Bread that contains too little salt is termed by bakers "ragged," and it has a poor and spongy appearance.

ON OXIDE OF ZINC.

BY DR. G. C. WITTSTEIN.

Mohr has found that a red heat is not necessary for the separation of the carbonic acid and water from precipitated carbonate of zinc, and that by a temperature of 570° Fahr. the volatile constituents are quickly and completely dissipated. This operation is best conducted in a porcelain dish or a glass retort. The oxide of zinc undergoes, by this method, no change of colour, but remains quite white; whereas that which has been subjected to a red heat, is mostly of a light yellow colour when cold.

When the process is conducted in a glass retort, it must be half filled with finely powdered carbonate of zinc, and placed on a triangle over a gentle charcoal fire. As soon as the watery vapour is perceived in the neck of the retort, it must be shaken with a circular motion. By this means, fresh portions of its contents are brought into contact with the heated bottom of the retort, which causes a more rapid evolution of the watery vapour. When the shaking is frequently repeated, the operation proceeds more rapidly to a close, which is known by the powder ceasing to swim and adhering to the bottom. For certainty, it must be then examined for carbonic acid, and, if found free from it, allowed to cool in an evaporating dish. When the oxide of zinc is prepared in a porcelain dish, the testing is easier, and in this case the contents must be stirred, which appears to be a more effective method. If the temperature is too high, even short of a red heat, the powder burns yellow.

The observation, that the oxide of zinc can be obtained by unequal burning white with a shade of yellow, induced the author to make farther researches, to ascertain the cause of the yellow colour, both of that prepared by heat and that obtained by precipitation. He commenced his inquiries by asking whether any of the impurities of the sulphate of zinc or of the carbonated alkali, used as the precipitating agent, had any influence in the change, or whether it was due to some alteration of the molecules of the oxide.

With this object, he took some carbonate of zinc, which, by the ordinary reagents, was found to be free from iron and all other metallic impurities. When treated in the manner previously described, to dissipate the carbonic acid and water, he obtained an oxide free from carbonic acid and of a snow-white colour. A small portion was viewed under a microscope with a magnifying power of 120 diameters. It had the appearance of consisting of small globules about the size of pins heads, the character of which was rendered more distinct by moisture. When in this condition, a small portion of the powder possessed a faint yellow colour, and was transparent.

Some of this oxide was exposed to a red heat for a quarter of an hour, which, when quite cold, was not snow-white but milk-white, which distinction could not properly be explained. By a comparison with the oxide of zinc which had not been thus treated under the microscope, the globules of the milk-white oxide appeared quite opaque, strung together, and smaller than the former kind. Now were to be

seen numerous small particles of a yellow-brown colour distributed throughout the yellow-white mass. By increasing the power of the microscope to 300 diameters, these globules became transparent. No difference could be discovered whether this oxide was heated to redness for a quarter of an hour or for two hours, either with the naked eye or under the microscope.

As these experiments did not confirm the hypothesis, that the change of colour was due to an alteration of the molecules of the oxide of zinc under the influence of heat, Wittstein proceeded more minutely to examine the carbonate of zinc, employed to ascertain whether it contained any foreign substances which had previously escaped detection, and which would account for the change of colour.

He tested its solution in muriatic acid for iron, lead, cadmium, and copper, without a satisfactory result. He then examined it for manganese, a trace of which is somewhat difficult to detect. For this purpose some of the solution was introduced into a stoppered bottle with some gold leaf, and warmed, but no reaction ensued.

After all these endeavours had been unsuccessful to discover the presence of a foreign body in the zinc carbonate by sulphuretted hydrogen and other reagents, applied with every precaution, he added to the solution sulphocyanuret of potassium, which produced no change of colour, and passed sulphuretted hydrogen through it, which altered its colour to a light red, an evidence that the solution contained a slight trace of peroxide of iron.

Wittstein concludes from this result that he is justified in attributing to the presence of a trace of peroxide of iron in oxide of zinc, the partial change of colour in streaks which the latter undergoes when heated to redness. He admits that this conclusion does not explain the cause of the oxide of zinc becoming yellow when heated, and after cooling again, white; but believes this change is due to some rearrangement of its molecules.——*Quarterly Journal of Pharmacy.*

ON AN INDIRECT METHOD TO DETERMINE MAGNESIA AND ALKALIES IN A COMPOUND.

BY DR. K. LIST.

In consequence of the troublesome nature of the process for separating magnesia from soda and potash, when they are not combined as pure chlorides, I have sought for an indirect method for determining these substances.

When all the bases, except the above-named, have been separated in the usual way from a solution of the substance under examination, it is to be evaporated to dryness in a water bath, and the dry mixture of sulphates and chloride of ammonia heated to redness in a platina crucible, to volatalize the ammonia salt; this is conducted, without loss, by means of an inward convex cover to the crucible. It is important that the bases should not be in combination with any other acid than sulphuric. Should it be otherwise, the resulting mass must be treated with sulphuric acid, to expel the other acids, and evaporated again

to dryness. To get rid of the excess of sulphuric acid, the salts are to be mixed with carbonate of ammonia, and heated to redness until the weight of the crucible is constant.

The contents of the crucible are then to be dissolved in water, and the sulphuric acid determined therein with chloride of barium. After the excess of barytes has been precipitated by sulphuric acid, the magnesia is to be determined in the ordinary way with ammonia and phosphate of soda.

By these means three values are ascertained, namely,—the quantity of sulphates present = A the sulphuric acid = S ; the magnesia = m. Let S′ of the sulphuric acid be reckoned as combined with m, and s as the sulphuric acid in combination with the alkalies, then—

$$a = A - (m + s' \text{ and } s = S - S'.$$

Let,-farther, K˙, Nȧ, and S‴ be considered as the atomic weights of potash, soda, and sulphuric acid, and, by the subjoined formula, the quantities contained in the mixture of potash (k) and soda (n) can be found :

$$k = \frac{\frac{s \,.\, Nȧ}{S'''} + s - a}{\frac{Nȧ}{K˙} - 1} \qquad \text{and } N = \frac{\frac{s \,.\, K˙}{S'''} + s - a}{\frac{K˙}{Nȧ} - 1}$$

$$\text{or } k = \frac{1{,}77829.\, s - a}{-\,0{,}33816} \qquad \text{and } n = \frac{217595.\, s - a}{0{,}5109}$$

I have proved the correctness of this method by operating on a known mixture of sulphates of soda, potash, and magnesia, of ascertained purity. The following table will show the accurate results of this trial :—

	Mixed.	Found.
Potash, ...	0,09765	0,09877
Soda, ...	0,03176	0,02999
Magnesia, . . .	0,02039	0,02162

It will be evident that the sources of error are less by the above given method than by those processes in which these bodies are directly determined.——*Liebeg's Annalen.*

ON TESTS FOR THE IMPURITIES OF ACETIC ACID.

Pure acetic acid is colourless, possesses strong acid properties and taste, and no empyreumatic flavour. It should have, according to the new London Pharmacopœia, a specific gravity of 1.048, and one hundred grains should saturate eighty-seven grains of crystallized carbonate of soda; consequently, the pharmacopœial acid consists of thirty-one per cent. of the anhydrous acid, and sixty-nine per cent. of water. It

should leave no residuum by evaporation. Sulphuretted hydrogen, nitrate of barytes, ferrocyanuret of potash, and nitrate of silver, should produce no precipitate in it. When it contains empyreumatic matter, which besides being evident to the smell, concentrated sulphuric acid causes its colour to darken. Sugar, in a more or less changed condition, is frequently one of the impurities of the German diluted commercial acid, and may be recognised by the taste of the residuum left upon its evaporation.

When sulphuretted hydrogen produces in acetic acid a milky turbidity, it shows that sulphurous acid is present, the presence of which is due to the decomposition of colouring and other organic matters, contained as impurities in the acetates, from which the acetic was prepared, when treated with sulphuric acid. The turbidity is caused by the separation of sulphur from the sulphuretted hydrogen, and from the sulphurous acid by reason of the hydrogen of the former combining with the oxygen of the latter, and forming water (Wittstein). If the sulphuretted hydrogen produces a black precipitate, either lead or copper may be present. The lead may be recognised by sulphuric acid giving a precipitate of sulphate of lead; and the copper, by the blue reaction which ensues, with an excess of ammonia. Sulphuric acid can be readily known when present by nitrate of barytes producing a white precipitate, insoluble in mineral acids. Nitrate of silver detects muriatic acid by throwing down a white precipitate, which changes, under the influence of light, to a violet colour, and is insoluble in nitric acid, but soluble in ammonia. Ferrocyanuret of potassium will indicate the presence of salt of iron when, by its addition, a blue precipitate results.

The above tests are not applicable to the same extent to detect the impurities of the brown vinegar of commerce, because manufacturers are allowed by law to add to it a small per centage of sulphuric acid, and there are always sulphates and chlorides and other salts present in it, derived from the water used in its manufacture; therefore, in testing for its impurities, an allowance must be made for those which arise from the necessary process of the manufacture, and those considered only as adulterations which are over and above such fair allowance. To detect such impurities as cayenne pepper, &c., it is merely necessary to neutralize the vinegar with carbonate of soda, when their presence will be palpably evident to the taste.

Acetic acid may be purified by distillation from those substances which are not volatile. By adding acetate of lead previously to its distillation, sulphuric and muriatic acids can be separated from it; and sulphurous acid can be removed by peroxide of manganese, which converts it into sulphuric acid. It can be freed from empyreumatic impurities by agitation with charcoal, subsequent filtration and distillation.

The strength of acetic acid and vinegar cannot be determined by specific gravity. The power of saturating an alkaline carbonate is the best criterion of the quantity of anhydrous acid present in any given sample. This method will only give correct results when the acid is pure, or when the quantities of free mineral acids have been estimated

previously by precipitation, so as to make the necessary deductions for their saturating power when the acid is neutralized with an alkaline carbonate. It would be well if pharmaceutists were more frequently to try the strength of their acetic acid, which is constantly sold with very plausible labels, about one part of the acid to seven parts of water, making the distilled vinegar of the Pharmacopœia, which statement we have oftentimes proved to be a very pretty fiction.

ON A NEW METHOD FOR DETERMINING NITROGEN.

BY ULLGREN.

Until the present time, no method has been devised for the determination of the nitrogen of bodies, as ammonia, by the weight of the apparatus. The following method is proposed for this direct determination:—

The nitrogenous body is to be burnt in the usual way with lime and soda. The evolved ammonia is conducted through a U shaped tube, which contains a little asbestos, and is filled two-thirds of its length, commencing from the end, through which the ammonia enters, with small pieces of caustic potash, which absorb the moisture and other volatile products; the remaining third is filled with small pieces of caoutchouc, to absorb the volatile hydrocarbon. The whole of this tube is placed in a tin vessel containing water; the water is to be heated, before and after the combustion, to about 170° Fahr. by means of alcohol, placed in a rim round the bottom of the vessel. The ammonia is by these means driven in another U shaped tube, connected with the above by a smaller bent tube and corks, which contains pieces of anhydrous sulphate of zinc. This salt absorbs the ammonia. The latter U shaped tube is weighed previous to the combustion and after it, the difference in weight gives the quantity of ammonia absorbed, from which the nitrogen may be calculated. To remove the last traces of ammonia from the combustion tube, its point must be broken at the close of the operation and the gas sucked into the tube containing the sulphate of zinc by means of an aspirator.——*Journal für Praktische Chemie.*

SOLUBILITY OF COMMON SALT.

It has been heretofore an established law that pure chloride of sodium is equally soluble in both hot and cold water. Fehling, who has recently re-investigated this subject, arrives at the conclusion that it is more soluble in boiling than in cold water. He finds that one hundred parts of a saturated solution of salt at 54° Fahr. contains 26,423 parts of chloride of sodium, consequently one hundred parts of water will dissolve 35,91 parts of salt at that temperature; and that one hundred parts of a boiling saturated solution of salt contains 28,53 parts of chloride of sodium, therefore one hundred parts of boiling water dissolves 39,92 parts of chloride of sodium.——*Annalen der Chemie und Pharmacie.*

PHARMACEUTICAL SCHOOLS.

Our readers are probably aware that a project is on foot to establish a new Pharmaceutical Institution. Whilst we respect the motives that have influenced the promoters of this undertaking, we very much doubt its policy; because it is quite unreasonable to suppose that two institutions with similar objects can be coexistent and successful, and because that there is an inherent good and elasticity in the constitution of the present Pharmaceutical Society, that, were its resources rightly administered, it is capable of meeting the wishes and the wants of the chemists of this country.

It is true that a majority of our brethren have no voice in the management of this Society, and equally true that they have a perfect right to establish a society for themselves; nevertheless, we think that this majority would consult their own interest best, by joining the ranks of the existing Society, and endeavouring by the power which they would thus possess, to accomplish those changes which are so ardently desired.

If the objects of the new institution were merely educational, they would receive our warmest support; for it is consistent with all experience to believe that rivalry, in this respect, would be attended with the happiest results. With such competition, pharmaceutical education would be more perfect, and obtainable on more reasonable terms. It is also notorious, that no undertaking which can be conducted by individual enterprise, is ever managed with much spirit and economy when directed either by large corporations or by the state, which spirit and economy are the secrets of success in private or individual speculations.

Besides, it is quite evident that an institution, established for the purposes of education, would not be insane enough to allow a rival educational institution to examine the qualifications of those educated by it; consequently, there must be a rival board of examiners in the new institution, unless, as in the case of University College, the original society resigned its functions, with reference to the power of granting diplomas to a third and independent body. Now, as we wish the Pharmaceutical Society to retain the power of testing qualification, having an organization suitable for that purpose, and as its educational functions have become a fungus of morbid growth which bids fair to devour all the other promising objects contemplated by this Society, we trust that this year, whether a Pharmacy Bill be passed or not, will be the last of the existence of its school.

We believe that the greatest curse that could arise to retard educational progress would be the existence of rival examining boards, emanating from distinct societies. They would offer a premium for

ignorance by lowering the standard of qualification, to invite those seeking diplomas, within their respective portals; in fact, all experience has proved that competing examining boards always attempt to outbid each other by relaxing the rigidity of, and therefore lowering the value of the test, until their certificates become bye-words and objects of contempt.

The promoters of the new Society will perceive, that, holding these views, and having higher duties to perform than merely supporting a rival institution because of its rivalry, however conducive such a step would be to increase our success as journalists, we cannot promise them the slightest sympathy or support. Whilst there is the remotest hope left of rendering the present Pharmaceutical Society the instrument of benefit to our brethren, which we know that it is capable of becoming, we shall devote our whole energies to the accomplishment of this one object, and countenance no project which has a tendency to divert us from it, or damage that Society.

We have no desire to detract from the good intentions of those who believed that the best method of promoting pharmaceutical education was to establish a school as one of the most prominent features of the Pharmaceutical Society; but we have for several years felt the conviction growing upon us that it was a mistaken policy, for which error the Society has paid dearly, both in money and by the defection of many of its former supporters.

Our opinions, which we derive from the experience of medical and other public institutions, as well as from abstract reasoning, are, that the surest and least expensive means of raising a high standard of qualifications and promoting education amongst pharmaceutists, are the establishment of one board of examiners, composed of men of known scientific skill and eminence, from whom the aspirant for educational honours would be proud to receive a testimony of his competency; and that the desire of receiving such testimony would excite the rising generation to seek for the necessary education, which would be promptly and ably supplied by private and competing enterprise and skill.

We scarcely have the patience to dispose of the everlastingly repeated dogma, that scientific schools cannot exist except when supported by extraneous aid. Of course they cannot exist when that which they offer for disposal is a commodity not in request. The remedy for this state of things is palpable to everybody, but to the drivelling propounders and propagators of this fallacy. Create a demand for education by making such education a source of profit and honour—a valuable commodity worth its cost. Plenty, then, will be found who are as willing to pay fully for a pharmaceutical scientific education, as they are ready now to give a handsome premium for a practical one.

THE BENEVOLENT FUND OF THE PHARMACEUTICAL SOCIETY.

"CHARITABLE deeds are like the dews of Heaven, which the sun exhales from the earth; and which again fall to the earth in fertilizing showers." The salutary lesson contained in this simile doubtless must have operated on the minds of some of the worthy founders of this Institution; for when we look back and view the arduous efforts that have been made to place this feature of the Pharmaceutical Society upon a permanent basis, we are surprised into a feeling of shame and sorrow, that the present rulers and supporters have so far retrograded from the good and excellent example of their predecessors, as to make this fund almost one only in name, and to tempt the inquiry,—does such a thing exist?

In inviting attention to this, of late, much neglected fund, we have no desire to draw any unjust comparisons with the other objects contemplated by the projectors of this Society, some of whom we feel no hesitation in believing were actuated by a purity of motive, an honesty of purpose, and a philanthropic zeal, alike as honourable to the individual as to human nature. We are induced to examine and consider this subject, from the present aspect of the Society, and position of affairs connected with it; also from the belief that the other objects so strenuously and lavishly supported, have failed in producing that unity and combined action amongst the chemists and druggists that we have been led to expect would result from them. It is an undeniable truth that the Society is in a declining state; many have seceded, and discontent exists among those that now support it; the present subscription is becoming totally inadequate to defray the expenses of the extravagant educational system that is now being pursued. The result must be disastrous, and will be deplored by every well-wisher of the Society, and by those that sincerely desire the protection and advancement of Pharmacy. As chemists and druggists, we would ask, what return and what advantages have we derived from our connection with this Society? Have we a better position, have we better protection, have we either honour or reward? Have the pupils who have been educated at such an enormous outlay become its supporters? Even if they all had, it would be a curious investigation to ascertain at what premium their yearly subscriptions have been bought. We ask again, what have we? We have a Society that has received a large amount of subscriptions, and which has conferred unbounded patronage and aggrandizement upon a few;—we have a Society which ought to have become, by this

time, a nucleus, a rallying point, a bond of union to all the chemists and druggists of Great Britain;—we have a Society that might, if the interests of the body had been consulted in preference to those of a few individuals, have placed aside out of its income a magnificent fund, applicable to the exigencies of the more unfortunate members of the trade; a fund that would have commanded the respect, the support, and gratitude of every right-minded chemist and druggist.

In following out these remarks, we are led to state that the laws relative to this fund contain the usual provisions for providing relief for unfortunate chemists and druggists who have been members or associates, and their widows and orphans; and why should we be without an efficient fund for such purposes? Other professions and trades are amply provided for in this respect, and do we possess any exemption from the precariousness of this world's good? Many causes may arise to reduce a man from a state of affluence to poverty; ill-health, accident, misfortune, and death, may prevent a proper and adequate provision being made for a family; in short, the wonder is that we have gone on so long without paying more attention to this important and paramount question. That the Pharmaceutical Society has not accomplished all that was contemplated, that the present order of its affairs is not such that is desirable, none will deny; that the course hitherto persisted in is unsuccessful, will be evident to all that make diligent inquiry. From these premises it will be plain that some other and more acceptable system must be adopted; and, strong in the conviction that an efficient benevolent fund would be an undoubted element of success, as the rich would subscribe from duty, the needy as an act of precaution, we would suggest that the members take this matter into immediate consideration, and, by an united and strong expression of opinion, insist that such steps be taken as will make the membership of the Pharmaceutical Society a tangible and permanent advantage.

THE PHARMACY BILL.

This Bill has been introduced into Parliament, and is likely to become the law of the land shortly, if there be not a dissolution of Parliament to prevent it; although it is not so stringent and perfect a measure as we could have desired, still, we are anxious that it should pass with the exception of one clause, against which we cannot sufficiently protest. The clause we allude to is the following:—

"At all meetings of the said society, at which, votes shall be given for the election of officers, all members entitled to vote, may give their

votes either personally or in cases of residence five miles from the General Post Office, Saint Martin's-le-Grand, London, by proxies authorised by writing, according to the form in the schedule to this act annexed, or in a form to the like effect, under the hand of the member of the said society nominating such proxy; and every proposition at any such meeting shall be determined by the majority of votes present, including proxies, the chairman of the meeting being entitled to vote not only as a principal and proxy, but to have a casting vote if there be an equality of votes."

It should be remembered that, according to a provision in the charter of the Pharmacentical Society, none but members present at the annual meeting can have a voice in the election of the council, which virtually precludes the greater portion of the members (that is, the country ones) of this society from participating in the choice of its officers. With a view to remedy this injustice to our country brethren, we suggested, last year, that a clause should be introduced into the Pharmacy Bill of that year, empowering them to vote by means of balloting papers which they could transmit by post to the secretary or council previously to the election, without the necessity of personal attendance. The suggestion was apparently adopted both in the first and in the present Bill, but in a manner that we neither anticipated nor can approve of; for it enables the country members to vote only by proxy, which renders their votes in reality worthless as matters of choice or preference, because the privilege is delegated to a second person to decide what candidates are to receive their suffrages. Besides, this clause, unless altered, contains the elements of an abuse which is subversive of every principle of fair representation and justice. Its tendency is to throw the whole power of the government of this society into the hands of two or three individuals who, by having the proxies of the country members in their pockets, could, if so disposed, arbitrarily decide every question by the undue power thus imprudently entrusted to them. We should have the Pharmaceutical Society becoming a creature of tyranny and corruption, and its leading men possessing a House of Lords' privilege, without the counteracting power and influence of the House of Commons' dependence and responsibility.

Another and equally serious objection we have to raise against this clause. It empowers the holders of the proxies not merely to vote by their own uncontrolled will in the choice of the officials, but also enables them to use the proxy votes upon all questions which shall come before the meetings. We scarcely need comment upon the absurdity of this provision, which allows those that are absent to vote upon matters, of the merits of which they must by their absence be necessarily ignorant. This is a privilege which we are sure the country members will neither

desire nor support, when they are acquainted with its existence and its tendency, for it cannot possibly be a source of benefit to them, and may be one of much evil. To trust men with irresponsible power, to be exercised in secret, is a false and impolitic step which is always to be deplored, although not discovered sometimes until it is too late to retrace it or avert its consequences.

In justice to the chief promoters of the Pharmacy Bill, we should mention that we have communicated to them our objections to the above clause, and that they have promised to remedy the evils complained of when the Bill passes into committee; nevertheless, we consider it our duty as journalists, to place our views before our readers.

A TEST FOR ALCOHOL IN ESSENTIAL OILS.

J. J. Bernoulli recommends for this purpose acetate of potash. When to an etherial oil, contaminated with alcohol, dry acetate of potash is added, this salt dissolves in the alcohol, and forms a solution from which the volatile oil separates. If the oil be free from alcohol, this salt remains dry therein.

Wittstein, who speaks highly of this test, has suggested the following method of applying it as the best:—In a dry test tube, about half an inch in diameter, and five or six inches long, put not more than eight grains of powdered dry acetate of potash; then fill the tube two-thirds full with the essential oil to be examined. The contents of the tube must be well stirred with a glass rod, taking care not to allow the salt to rise above the oil; afterwards set aside for a short time. If the salt be found at the bottom of the tube dry, it is evident that the oil contains no spirit. Oftentimes, instead of the dry salt, beneath the oil is found a clear syrupy fluid, which is a solution of the salt in the spirit, with which the oil was mixed. When the oil contains only a little spirit, a small portion of the solid salt will be found under the syrupy solution. Many essential oils frequently contain a trace of water, which does not materially interfere with this test, because, although the acetate of potash becomes moist thereby, it still retains its pulverent form.

A still more certain result may be obtained by distillation in a water bath. All the essential oils which have a higher boiling point than spirit, remain in the retort, whilst the spirit passes into the receiver with only a trace of the oil, where the alcohol may be recognised by the smell and taste. Should, however, a doubt exist, add to the distillate a little acetate of potash and strong sulphuric acid, and heat the mixture in a test tube to the boiling point, when the characteristic odour of acetic ether will be manifest, if any alcohol be present.

CHEMICAL EXAMINATION OF RESIN OF JALAP.

BY B. SANDROCK.

It is a well known fact that when resin of jalap is treated with ether, we obtain two kinds of resin, one soluble, and the other insoluble in ether. Dr. Kayser chose first for his analysis that part of resin which is insoluble in ether. This resin, purified by means of charcoal, was friable, almost colourless, without smell and taste, insoluble in ether and water, but easily to be dissolved by spirit of wine; the alcoholic solution reddens litmus slightly. The resin, again precipitated by water, was perfectly soluble in solution of caustic ammonia and acetic acid. This resin was difficultly dissolved in cold solutions of caustic potash and soda, but perfectly soluble when hot, and could again be readily prepicitated from the alkaline solutions by acids. The solution of this resin in ammonia was of a bright brown colour, and became neutral by volatizing the superfluous ammonia. It is consequently a resinous acid, which is distinguished from other resinous acids, by the facts that it does not precipitate the bases from metallic salts, such as nitrate of silver, sulphate of copper; it afforded only a precipitate when acted upon by basic-acetate of lead. A question arose, whether the resin of jalap, dissolved in alkaline fluids, undergoes any changes in its constitution. To answer this question, Kayser undertook several analyses, the results of which were as follows:—The uncombined resin of jalap gave C 42, H 35, O 20. The resin, precipitated by oxide of lead, gave C 42, H 36, O 21. It is evident that resin of jalap, combined with the bases of salts, acquires the elements of one equivalent of water. Dr. Kayser, has named the unchanged resin of jalap, rhodeoretin, and that modified by bases of salts, hydro-rhodeoretin.

By dissolving rhodeoretin in absolute alcohol, and submitting the solution to the action of chlorine, and subsequently adding water to it, Kayser obtained an oleous fluid, dark yellow, possessing a pleasant smell, easy to be volatilized by heat, soluble in water, which he called rhodeoretin oil.

The part of the resin soluble in ether, possesses eminently the disagreeable smell of jalap, a prickly taste; its solution reddens litmus, and in drying leaves a greasy spot on paper; it is soluble in alkaline fluids. If the alcoholic solution is allowed to stand, mixed with water, for a lengthened period, prismatic crystalline needles are precipitated. According to these properties, Kayser includes the soluble jalap resin among the fatty acids. Sandrock in general agrees with Kayser; but, according to his analysis, the jalap can be resolved in three different resins, one soluble in ether, the second obtained by precipitating the alcoholic solution by oxides of lead; the third remains unprecipitated in this solution.

That part of resin which is insoluble in ether, but is precipitated from the alcoholic solution by oxide of lead, Sandrock calls alpha resin; that which is not precipitated, beta resin; that part which is soluble in ether he calls gama resin.

The alpha resin agrees in its properties with Buchner's and Herberger's jalapine. Sandrock calls ipomic acid, the produce of this resin

when treated by boiling carbonated alkaline solution; and the one obtained in the same way from beta resin, jalapic acid. The gama resin forms in ether a yellow solution, and a purple one in concentrated sulphuric acid.——*Archives der Pharmacie.*

ON THE PREPARATION OF CHLOROFORM FROM THE ESSENCES OF LEMON, COPAIBA, PEPPERMINT, AND BERGAMOTTE.

BY M. CHAUTARD,

Professor of Chemistry at the Lyceum of Vendôme.

M. CHAUTARD, after having completed his experiments for the production of chloroform by means of oil of turpentine instead of alcohol, led by analogy, proceeded to try by a similar method to prepare it by means of the essences of lemon, bergamotte, copaiba, and peppermint, and succeeded. However, the quantity of essences upon which he acted was too small to carry on a minute analysis. In the meanwhile, his researches led him to discover formic acid in the calcareous residuum of the operation. It was already known, M. Chautard observes, that oil of turpentine, when old and exposed a long time to the action of the air, was transformed into formic acid, which observation is due to M. Wappen. On the other hand, M. Schneider, by collecting the volatile products of the oxidation of turpentine, by means of nitric acid, detected therein the presence of acetic, metacetic, and butyric acids. Finally, a few years ago, Mr. William Bastick* showed that hypo-chlorite of lime, by reacting upon neutral unazotised bodies, such as sugar, starch, &c. gave rise to the formation of a certain quantity of formate of lime; hence, turning to advantage the details given by this chemist, M. Chautard continues—I thus have carried on my operation:—

After having ascertained, by means of the solution of indigo, that the residuum contained on the alembic did not contain any hypochlorite of lime, the presence of which would have prevented the extraction of formic acid, I threw the whole upon a cloth, and added sulphuric acid to the filtered liquor to precipitate the lime retained in a state of chloride or formate. This liquor, after having been filtered anew, was distilled, and the product was a mixture of formic and hydrochloric acids, which I saturated by means of carbonate of soda. By subsequent evaporation to dryness, I succeeded, by adding afterwards a little water, in separating the formate of soda from the chloride. By means of the formate of soda, I proved the principal properties of formic acid, and besides, produced from it the formate of silver, which is decomposed by a boiling heat, leaving a precipitate of metallic silver.

In finishing this communication, I must observe that fixed oils, treated in the same way by hypochlorite of lime, do not produce chloroform; however, the reaction which occurs is so strong and indicative of interesting results that it induces me to continue my experiments.——*Journal de Pharmacie.*

* "Journal de Pharmacie," 3e série, t. 14.

Reviews.

THE LIFE OF THE HONOURABLE HENRY CAVENDISH: *Including an abstract of his more important scientific papers, and a critical inquiry into the claims of all the alleged discoveries of the composition of water, by* GEORGE WILSON, M.D., F.R.S.E. London: Printed for the Cavendish Society, 1851.

THE CAVENDISH SOCIETY is unquestionably one of the most valuable instruments of the age for the diffusion of knowledge, with reference to chemical literature and science. Although its success has been considerable, yet we believe, were its advantages more fully known and appreciated by pharmaceutical chemists, they would gladly contribute their aid, by way of the small annual subscription, for which they would receive more than a *quid pro quo*, and the usefulness of the Society would thereby be greatly extended. Every additional contributor to this society confers a progressional benefit on himself and an increased advantage to those who have previously joined it; for it is a self-evident truth, that the larger the number of copies of a work printed, the cheaper in proportion is the cost of each copy, and the whole of the funds of this society are returned to the members in the shape of books.

We trust what we have here written, as comparatively disinterested persons, will cause many of our brethren to join the ranks of this society for the current year, and that the council will seriously take into their consideration the propriety of publishing some work especially adapted for pharmaceutists, as there would be no difficulty in selecting one, for the literature of Germany abounds with them.

The council of this society should recollect that, for every chemist who pursues science purely as a profession, there are, at least, fifty chemists who are connected with the practice of pharmacy.

We think that the society acts wisely in confining its operations chiefly to the translation of foreign works of established reputation. By so doing it saves the cost of authorship, and merely pays for translation, and makes the "assurance doubly sure," that the members will receive that only which has undergone the ordeal of previous scrutiny by the gifted *savans* of other countries.

Besides, it is a notorious fact that English chemists do not produce those elaborate and valuable works for which their continental brethren enjoy a celebrity. In confirmation of this fact, need we point to the standard treatises on chemistry by Berzelius, Dumas, and Gmelin, to say nothing about a host of others. The cause of this short forthcoming will be explained, not by the incapacity of our countrymen as chemical writers, but by the demand for such works being so limited as not to justify or pay for their publication.

Science, unlike climate, religion, or politics, being universal and not local, is always one and the same in every land. Its truths bear no evidence of their exotic origin, and are equally valuable and in-

structive whether the products of our own country or the transplantations from other climes. We make these observations because we know that English pride and prejudice often treat with neglect and contempt even the chemical books of foreign authors. To those who feel this distaste and wish to have it counteracted, we say, subscribe to the Cavendish Society, and you will feel a debt of gratitude to those by whose exertions it has been called into existence.

In making these preliminary remarks, we have almost forgotten the work at the head of this article. It may seem strange and inconsistent, after what we have written in praise of the Cavendish Society, that we are not disposed to speak equally well of one of the works which have been issued under its auspices; at the same time we desire it to be clearly understood, that the life of Cavendish is the only work published by that society that does not receive our highest commendation.

It would appear to us that the originators of this society, having given it the name of Cavendish, felt themselves bound in consequence to induce somebody to write his life, upon the condition that the resulting book should possess a portly form. The issue has been that from the most meagre materials, a large octavo volume of nearly five hundred pages has been published, when a work of one-tenth of that size would have been amply sufficient to record all that is important and worthy of learning respecting Cavendish. In the execution of this task, Dr. Wilson has been compelled to rake up all the *pros* and *cons* of the so-called water controversy, which has appeared in various periodicals and pamphlets *usque ad nauseam*, and which would never have excited much attention, had it not been for the high positions of the belligerents engaged therein.

Wearisome as this almost endless repetition of an uninteresting subject is, we freely admit that the author has treated it with a judicial impartiality that redounds to his credit, and has used his best endeavours to make it as inviting to the reader as possible. Had he been more fortunate in the selection assigned to him, we believe, from the biographical talents and the knowledge of chemical history which he has displayed in writing this work, he would have fulfilled his task with great credit to himself and greater satisfaction to his readers.

Cavendish's genius was, doubtless, as eminently great as his character was eccentric, and his manners reserved; for we learn, in the classical and truthful language of his biographer that, morally, his character was a blank, and can only be described by a series of negations.

"He did not love, he did not hate, he did not hope, he did not fear, he did not worship as others do; he separated himself from his fellow men, and apparently from God. There was nothing earnest, enthusiastic, heroic, or chivalrous in his nature, and as little was there anything mean, grovelling, or ignoble. He was almost passionless. All that needed for its apprehension more than the pure intellect, or required the exercise of fancy, imagination, affection, or faith, was distasteful to Cavendish.

"An intellectual head thinking, a pair of wonderfully acute eyes observing, and a pair of very skilful hands experimenting or recording, are all that I realize in reading his memorials. His brain seems to have been but a calculating engine, his eyes inlets of vision, not fountains of tears; his hands instruments of manipulation, which never trembled with emotion, or were clasped together in adoration, thanksgiving, or despair; his heart only an anatomical organ, necessary for the circulation

of the blood. Yet, if such a being, who reversed the maxim, '*Nihil humani me alienum puto*,' cannot be loved, as little can he be abhorred or despised. He was, in spite of the atrophy or non-development of many of the faculties which are found in those in whom the 'elements are kindly mixed,' as truly a genius as the mere poets, painters, and musicians, with small intellects and hearts, and large imaginations, to whom the world is so willing to bend the knee. He is more to be wondered at than blamed.

"Cavendish did not stand aloof from other men in a proud or supercilious spirit, refusing to count them his fellows. He felt himself separated from them by a great gulf, which neither they nor he could bridge over, and across which it was vain to stretch or exchange greetings. A sense of isolation from his brethren made him shrink from their society and avoid their presence; but he did so as one conscious of an infirmity, not boasting of an excellence. He was like a deaf mute, sitting apart from a circle, whose looks and gestures show that they are entering and listening to music and eloquence, in proclaiming or welcoming which he can be no sharer. Wisely, therefore, he dwelt apart, and bidding the world farewell, took the self-imposed vows of scientific anchorite, and, like the monks of old, shut himself up within his cell. It was a kingdom sufficient for him; and from its narrow window he saw as much of the universe as he cared to see. It had a throne also; and from it he dispensed royal gifts to his brethren. He was one of the unthanked benefactors of his race, who was patiently teaching and serving mankind, whilst they were shrinking from his coldness or mocking his peculiarities. He could not sing for them a sweet song, or create 'a thing of beauty,' which should be 'a joy for ever,' or touch their hearts, or fire their spirits, or deepen their reverence or their fervour. He was not a poet, a priest, or a prophet; but only a clod, clear intelligence, raying down pure white light, which brightened everything on which it fell, but warmed nothing—a star of, at least the second, if not of the first magnitude in the intellectual firmament."

It only remains for us now to express the hope that Dr. Wilson has resumed the task, as he tells in the preface to this book, he had originally intended to execute, and which was interrupted by the labour of writing the life of Cavendish, namely,—to publish the lives of the chemists of Great Britain; for how many of us would not rejoice to be better acquainted with the careers of such men as Davy, Wollaston, Turner, Henry, Dalton, Tennant, and many other cherished names dear in the memory of the present generation.

THE POCKET FORMULARY AND SYNOPSIS OF THE BRITISH AND FOREIGN PHARMACOPŒIAS: *Comprising standard and approved formulæ for the preparations and compounds employed in medical practice, by* HENRY BEASLEY. Fifth edition. Corrected, enlarged, and adapted to the last editions of the Pharmacopœias. London: John Churchill; 1851.

A WORK which has enjoyed such an extensive sale as Mr. Beasley's must have supplied a want felt by numerous compounders of medicine, although it is not equal to its professions. It certainly contains a synopsis of the last editions of the British Pharmacopœias, but we cannot add also of the foreign ones.

We advise Mr. Beasley, before he compiles another edition, to consult a work published by Leopold Voss, of Leipzig, entitled, "Coden der Pharmokopöen," which contains the last edition of every known Pharmacopœia, and is kept constantly complete in this respect by supplemental additions.

ON THE PRECIPITATION OF SOLID BODIES FROM LIQUIDS.

BY TH. SCHEERER.

A SERIES of investigations, conducted to explain the conditions under which solid bodies are slowly or quickly precipitated from fluids, gave as the result that acid fluids are those in which precipitation is most rapid.

The specific gravity of the fluid cannot stand in relation to this fact, because saline or acidulated water, as is well known is of a greater specific gravity than pure water; and yet precipitation takes place slower in the latter than in the former. There must be some other cause for this behaviour, which cause Scheerer attributes to a kind of cohesion. The particles of pure water possess a stronger affinity for each other than the particles of a saline or an acidulated water, and, consequently, the latter allow precipitates to fall more easily than pure water does. By means of a drop apparatus, he ascertained that—

			Weighed in grammes.
100 drops of	pure water, ...		5,106
100 „	1 vol. of soda solution mixed with 12 vol. of water, ...		4,928
100 „	1 vol. of sulphuric acid mixed with 24 vol. of water, ...		4,915

To find the relative magnitude of the drops, their ascertained absolute weight must be divided by their respective specific gravities. The specific gravity of the diluted solution of soda was 1,007; that of the diluted sulphuric acid, 1,051.

	Relative magnitude of the drops.
Pure water, ...	5,106
The diluted soda solution, ...	4,894
The diluted sulphuric acid, ...	4,677

These facts will prove to be of great use frequently. The collection of precipitates is often attended with great loss of time. To obviate this inconvenience, we have only to add an acid or a salt to the fluid, and the precipitate falls rapidly. The precaution must be observed, however, not to add a salt or an acid which would induce a chemical change in the compounds with which it comes in contact.—— *Poggendorf's Annalen.*

A FORMULA FOR TINCTURE OF COCHINEAL.

BY E. L. JONES.

SIX parts of finely powdered cochineal are to be macerated in a steam bath with seventy-two parts of distilled water, until the fluid is reduced to one half of its bulk, and then filtered. The residuum is to be washed with a mixture of thirty parts of water, and two parts of solution of ammonia. Both resulting liquids are to be mixed, and to be evaporated to thirty-six parts; and, when cold, thirty-six parts of rectified spirit are to be added to the watery solution.

The tincture thus obtained is of a dark red colour, with a shade of violet, of the consistence of a very thin syrup, and gives no sediment. ——*Archiv. der Pharm.*

ON THE LIME-WATER TEST FOR LIQUOR POTASSÆ, AND ON THE INSOLUBILITY OF LIME IN ALKALINE SOLUTIONS.

BY DR. BUCHNER, JUN.

It is stated, in many pharmacopœias, that the absence of carbonic acid in liquor potassæ is proved when lime-water produces no turbidness therein. This test, as well as that of muriatic acid, for detecting small quantities of carbonic acid by effervescence, is not only superfluous, but absolutely incorrect, because lime-water produces a turbidity in liquor potassæ when it is completely free from carbonic acid, as we have satisfactorily shown in the laboratory of this place. This fact is explained by the insolubility of lime in an alkaline solution, and Pelouze has recently made a communication to the Academy of Sciences of Paris, in corroboration of this statement.

According to Pelouze, when one part of caustic potash or caustic soda, in 100 parts of water, with an excess of lime, for example 10 parts, is boiled, the liquid filtered therefrom, either hot or cold, dissolves not more than $\frac{1}{50000}$ part of lime. Although so small a quantity cannot be weighed, yet it is not less certain that the above given quantity is as likely to be a maximum as a minimum, if oxalate of ammonia produces in a solution consisting of 1 part of lime and 50,000 parts of water, a turbidity as distinct as in the previous case

It follows, from this research of Pelouze, that it is unnecessary to examine either caustic potash or soda, or their solutions, for lime, as they can only contain the very least portion of it. Moreover, it results from this insolubility of lime, that it is useless in making caustic solutions to add lime-water, to ascertain if their causticity be completed, as in either case a white precipitate results.

A RECIPE FOR A SUPERIOR INK FOR STEEL PENS.

BY DR. HAENLE.

In consequence of the extensive employment of steel pens, and the desirableness to possess an ink which should not corrode them, Dr. Haenle instituted some experimental inquiries to ascertain the cause of the corrosion. From these inquiries, he draws the conclusion that a small quantity of a salt of copper, which is almost universally present in ink, from an impure sulphate of iron being used in its preparation, is the cause of the corrosive effect, and also of a deposit of metallic copper on the pen. He has, in consequence of this observation, prepared an ink from sulphate of iron (free from copper) galls, gum, and distilled water, which he has used for a long time with the most satisfactory result. The proportions which are employed to produce a fine black ink are—Of galls, eight ounces; of gum and of pure sulphate of iron, each four ounces; and of rain or distilled water, ninety-six ounces. To prevent mouldiness, he adds a few grains of bichloride of mercury.

[The latter addition is rather an inconsistency, as the salts of mercury have a similar action on steel to those of copper. The best plan to prevent mouldiness is to add a few drops of creosote to the ink.——*Editors of Annals, &c.*]

SHORT NOTICE OF A CHEMICAL EXAMINATION OF ERGOT OF RYE.

BY DR. F. L. WINCKLER.

At present, I am engaged on an examination of ergot of rye, which promises an interesting result. When the extract-like ergotin is distilled with potash, a distillate is obtained, which contains, besides ammonia, a highly disgusting compound to the smell. This substance has a powerfully diuretic and depressing action, and resembles the volatile alkaloids in many of its properties. I hope shortly to ascertain whether it is a product from the decomposition of, or an educt from ergotin. It may be remarked that this volatile body appears to agree with that obtained from chenopodium fœtidum.——*Buchner's Report.*

FORMULÆ FOR LIQUOR OPII SEDATIVUS AND LIQUOR MORPHIÆ BIMECONATIS.

Infuse three ounces of powdered Turkey opium with forty ounces of cold distilled water, with frequent agitation, for two days, and then filter. Boil the filtered liquid until it is reduced to thirty-four ounces, and when quite cold, add to it six ounces of rectified spirit. Set aside the mixture for three or four days in a cool place, and again filter; it is then ready for use. The liquor opii thus obtained keeps well, is free from narcotine, and possesses all the anodyne properties of the opium. All the formulæ for this preparation, which involve the use of acids, such as citric and acetic, do not accomplish the before-mentioned objects, and are utterly dissimilar to the solution originally introduced under the name of liquor opii sedativus. The preparation sold under the name of liquor morphiæ bimeconatis is made in the manner above described, with the addition that it is partially deprived of its colouring matter by means of animal charcoal, which operation has rather a detrimental tendency, as it removes also a portion of the morphia.

A FORMULA FOR BALLS FOR CHLORINE FUMIGATION.

Sigl, of Munich, has many years prepared the above balls, which answer the purpose for which they are intended remarkably well; the receipt for them is as follows:—Take common salt, powdered sulphate of iron and clay, of each 1½ pounds, black oxide of manganese in powder, 3 ounces. After having mixed the powders, knead them with the clay and a little warm water, until the mass has the consistence of pills. It is then to be divided into balls of a convenient size, which are to be dried in a gentle heat. When it is desirable to fumigate a room to destroy miasma, contagious matters, or offensive smells, one of these balls is to be placed on a red-hot coal therein. The chlorine is evolved so gently that the sick suffer little or no inconvenience from it when applied in this manner. These balls are recommended as a cheap means for securing the object in view, and because they do not spoil by keeping.

ON THE ACTION OF PERNITRATE OF MERCURY ON ALCOHOL.

BY C. GERHARDT.

When a solution of pernitrate of mercury is poured into alcohol, no reaction ensues if the solution of the salt contain sufficient of acid. If the mixture be warmed without boiling, a white salt is precipitated, consisting of microscopic six-sided tables. By a further heating the formation of this salt continues. It is a compound of nitrate of the peroxide of mercury and nitrate of the oxide of ethal, in which five equivalents of hydrogen are displaced by peroxide of mercury. Its formula is $HgO, NO_5 + C_4 Hg_5O, NO_5 + 2\ HO$. Its analysis gave carbon 2,7 — 2,8, hydrogen 0,4 — 0,3, mercury 78,4. This compound explodes by a strong heat, without giving such a detonation as fulminating mercury. With potash and ammonia it produces a grey oxide, which dissolves when warmed in muriatic acid, without the evolution of a fruity odour. This solution then gives, with potash, a precipitate of peroxide of mercury.

TO CORRESPONDENTS.

A contemporary has taken animmense amount of trouble, which has only ended in a feeble attempt to cast a suspicion that we have unjustifiably used the name of Liebig in connection with an article in a previous number of this journal. The real facts of this matter are these. There has been published in Germany, in successive editions, a work of unequalled repute, for many years. It consists of four distinct treatises: one, on chemistry and pharmacy, by Liebig; another, on pharmaceutical botany, by Esenbeck; a third, on pharmaceutical mineralogy, by Marquart; and a fourth, on pharmaceutical zoology, by the same author. The entire work is called "Geiger's Pharmacy," from Geiger being its original projector and editor. We shall give also the full title of that portion of this work from which the paper alluded to was translated, to show how far we were justified in using Liebig's name. It runs thus, as verbatim translated:—"Manual of Chemistry with reference to Pharmacy; by Justus Liebig, Professor of Chemistry at the University of Giessen (as a new edition of the first volume of Geiger's Manual of Pharmacy)." Moreover, to prove our justification we may mention, in the preface to this volume Liebig regrets the delay that has taken place in its publication, and explains it by having to rewrite and rearrange nearly the whole work, and by having to complete several investigations to render it more perfect. Further, this portion of Geiger's Pharmacy was translated into French as Liebig's work, without any reference to Geiger, and the organic portion of Turner's Chemistry is a translation from it without mentioning Geiger's name. It is constantly referred to by German writers as being alone the production of Liebig; and it is somewhat curious and conclusive as regards our case, to remark that it is referred to as Liebig's "Handbuch der Chemie" at page 373, of the very same number of the journal where we are charged with using Liebig's name improperly. As regards the article appearing in previous editions of Geiger's work, we need only observe that a similar article does appear on the subject, but not the same article in every edition. Like most articles in works which have passed through several editions, it has received emendations from time to time. If our contemporary has prevailed on Liebig to publish a statement with authority to suit his own purposes, he should have let the affair rest there, and not have told his readers what he saw himself, for he must be aware that we know his capabilities too well to allow such stuff to pass muster. Our contemporary adds, after making Liebig's statement, "But the article itself makes a part of the previous editions. We have seen it in the third edition of Geiger's 'Handbuch.'" He wishes his readers here to understand that by having seen the article in question, he was able to recognise it in the German as the original of our translation. We must venture to say, that to recognise anything written, a person must be able to read and understand it. Now, it is a notorious fact

that our contemporary is utterly unacquainted with the language, literature, and science of Germany; therefore, had it existed precisely as stated by him, he could not have seen it in the sense he wishes to convey by the word "seen." However, we freely forgive our friendly rival, knowing how terribly chagrined and jealous he is at the superior contents, and the consequently unprecedented success of our journal. Our readers well know that had we published the article in dispute without Liebig's name, our contemporary would have induced Liebig to request that he would, on authority, explain that we had pirated it without acknowledging that he was its author. Such are the effects of the perversity of little minds and of evil influences on great ones.

Tyro.—1. Cod liver oil is prepared by boiling fresh livers in water, which causes the oil to separate from them, and float on the surface of the water, from which it may easily be removed. To render it bright at all ordinary temperatures, it must be filtered in cold weather. 2. The twelfth number of the "Annals" will be supplied with an index, and a title-page, so that it may be bound into a volume. 3. Pereira's "Materia Medica."

An Apprentice, Stroud.—Balfour's "Manual of Botany," published by Griffin, price 12*s.* 6*d.*

Mr. Charles Samuel's communication, acknowledged with thanks.

W. D. T., and *A Wellwisher, Rothbury.*—No persons can be admitted members of the Pharmaceutical Society, unless in business on their own account prior to 1843, except by examination. Two guineas is the entrance fee, and one guinea the annual subscription for country members. The payment of this sum admits chemists to all the privileges of membership, such as the use of the library, the admission to lectures, &c. &c.

B. R. P., Manchester.—It would not be prudent or safe to administer the medium doses recommended, three or four times a-day.

Verus, Liverpool.—The ammonia test for balsam of copaiba is not to be relied on. The best method to ascertain its purity is to submit the balsam to distillation, and examine the products, one of which ought to possess the characteristics of the resin, and the other of the volatile oil, if the balsam be pure.

An Apprentice, Cheltenham.—Study Lindley's "Elements of Botany," Kane's "Elements of Chemistry," and Pereira's "Materia Medica." When you have mastered these works, you may proceed with Zoology, Mineralogy, and Physics.

J. H. P.—The last edition of "Fownes' Chemistry," edited by Dr. Bence Jones, would meet your wishes; the other work mentioned is worse than useless.

Mr. T. Ashworth, Marsden.— If we could supply you with an economical method for obtaining caustic soda directly from chloride of sodium, we should require £.20,000 for the information, which sum would be under its value. The most economical method at present known is, by treating a solution of soda-ash with caustic lime.

Mr. E. G. Frank, Wakefield.—Jalapine is a term applied to various resinous preparations of jalap. The simplest process to obtain it is to treat a strong alcoholic tincture of jalap with animal charcoal, to remove the colouring matter, and precipitate the resin by the addition of a large portion of water, which resin, or jalapine, may be collected on a filter and dried. For a formula for liq. opii sedativus, see p. 94 of the present number.

A Subscriber, Petworth.—Purchase a Coffey's Esculapian still from Mawe's, Aldersgate Street, price five guineas. It is extremely useful for many purposes, as, without an increase of cost for fuel, several processes can be conducted at once with it.

Mr. S. Bland.—We cannot inquire into the private formulæ of individuals. You will find a process for making liquor morphiæ bimeconatis at p. 94.

M. P. S.—1. You will learn what you require in an article on acetic acid in this number of the "Annals." 2. However gratifying the article in question might be to you, it afforded us no particular pleasure in writing it, as we do not inflict chastisement from choice, but from duty. It would be well if our opponents could understand the old proverb, that "those who live in glass houses should not throw stones."

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG,

Professor of Chemistry at the University of Giessen.

No. III.

Of Mechanical Separation of Heterogeneous Parts.

The mechanical separation of heterogeneous parts is mostly very simple; for example, the plucking of leaves and flowers from the stems, the cleaning of roots from their filaments, or the stripping them from their bark, and the separation of seeds from their husks.

The object of decantation (*elutriatio*) is to separate, by means of water, finely divided solid bodies from coarser particles, or those which are of a less specific gravity, from those which are of a greater specific gravity. When the substances are reduced to powder, they are first mixed with a sufficient quantity of water, so as to form a thin mixture, and afterwards poured out gently from one vessel to the other. The coarser particles settle first to the bottom, and are kept back in the decanting vessel, the more minute and lighter particles deposit themselves slower. This mode of operation is of great use in many analyses.

Solid bodies are separated from the fluids by means of causing the liquor in which the solid particles are suspended, to pass through a porous body. If the body thus employed has pores large enough to allow some of the less coarser parts to run away with the fluid, it is called straining. When, on the other hand, the body employed is such as to prevent the most minute solid parts from escaping with the liquid, it is called filtration.

The instruments employed for the object of straining, are the colatorium, which is a piece of flannel or linen, fixed by tacks on a square wooden frame (*tenaculum*); if the material is made of a conical form, the instrument is called a filtering bag (manica Hippocrates). Sometimes sieves, or colanders of tin are also employed; and for fatty and resinous substances for salves and ointment, wire baskets are used, covered with hemp. Strong acids are percolated in funnels filled with coarsely powdered glass. Filtration is performed by means of unsized paper made into a cone, placed in a funnel so arranged as to keep up

some space between the cone and the funnel, in order to facilitate the operation. This object is obtained by small pieces of wood or glass arranged round the inside, or when the funnel is ribbed, or the filtering papers made to assume several folds, or by using a filtering basket made of small rods, in the shape of a funnel. Bishof and Gmelin have suggested an ingenious contrivance for obtaining, by means of small filters, a great quantity of fluid, without being continually obliged to pour fresh liquid in the filter. It consists in turning a large bottle, filled with fluid, in the filter, so as to plunge its neck half an inch in the filter filled with fluid. The bottle is fixed to a board. By these means, the operation goes on without interruption. As soon as the liquid in the filter is sunk below the neck of the bottle, the liquor in the bottle begins to fill it anew, and ceases to flow as soon as the orifice is covered. However, it being possible for some parts of the solid materials, when the air strikes upon the fluid, to be driven into the bottle, which in some cases is detrimental, Berzelius has suggested to stop the bottle with a perforated cork, containing a small glass tube open on both ends, the lower part ending in a small point, bent a little upwards. The glass tube has a lateral opening half an inch above the point, formed with a smaller tube turned upwards. When the fluid in the funnel runs off to a certain point, the air penetrates through the lateral opening in the bottle, and causes the liquid to flow. According to Scheefer, the same object can be accomplished by means of a cork having two holes, one fitted with a small straight tube, the other with one bent upwards in an acute angle. Several more contrivances may be found in Poggendorf. The instrument recommended by Gay Lussac for filtering, consists in a Woulfe's bottle, with two openings, in the one of which is adapted a glass syphon, the one branch of which reaches almost to the bottom of the flask, and the other an exterior one, which is the longest. A straight glass tube is fixed in the second opening, with its lower end placed higher than the external end of the syphon. The vessel is filled almost to the brim with the liquid which is to be filtered, and stopped with perforated corks. The filter is placed under the external end of the syphon. In order to operate, you blow through the straight tube, and once the fluid is in motion, the air always filling the vacuum, will keep up the action. This action itself can be accelerated or retarded by shifting the position of the straight tube. Common blotting paper is often impregnated with metallic impurities, which are dissolved, as often as the fluid contains some acids; hence it is better to use paper, such as is manufactured for printers, before it is sized.

When a great quantity of liquid is to be filtered, the paper is spread on a bag of linen, or felt, made in the shape of a cone. Several other filters have been suggested, founded on the application of hydrostatic laws; the simplest of them is that invented by Schindler. It consists of a bottle with the bottom cut off, this gap is closed with filtering paper and a coarse cloth, bound around the flask with a string. The bottle is filled with the fluid which is to be submitted to filtration, and placed in a large fixed funnel. Stop the bottle with a cork, on which is fixed a funnel with a long tube. Fill the funnel also with the

fluid, and keep it always replenished. The filtering goes on most admirably.

Despumation is the operation by which the solid parts are separated from the fluids by means of a gentle heat or ebullition. By these means the impurities thrown off as a scum to the surface are removed with a perforated spoon or ladle. The reason is, that heat coagulates the albumen of such fluids, which combines with the solid parts, and ascends to the surface.

If the liquid does not contain sufficient albumen, the white of egg is added to facilitate the operation. Heat, however, must be applied gently and gradually, else the foam, instead of floating on the surface, mixes again with the liquid, and renders it turbid. Syrups are allowed but to boil up a few instants, and are filtered whilst yet warm. Care also must be taken not to be too particular in clearing medicinal extracts, else some of their more active principles will be lost. Spirituous and acidulous fluids are clarified without the assistance of heat, by adding isinglass, the white of eggs, or bullock's blood, and decanting them after a few days' infusion.

Expression (*expressio*) is often employed to separate solid parts from the liquid by mechanical pressure. If only small quantities are to be worked upon, and little strength is required, the mass is put in a coarse cloth, and the liquid is wrung out by the hand. In order to avoid this troublesome manipulation, Beindorf invented a decoction press. It consists in a solid piston, moved like a root knive by a lever, which enters a cylinder of tin enclosed in a wooden box, having a tin sieve at the bottom. By this contrivance, decoctions are more easily extracted. But if considerable strength is required, presses are employed, particularly presses with screws.

There are two kinds of presses in use—the dish press and the plate press.

The first has but one perpendicular screw, which works up and down through an horizontal beam, supported by two columns, containing the nut. The objects to be pressed, enclosed in a bag of linen, are put in a metal dish with a beak, which is fixed under the press. It is useful to have a second dish with holes, fitting in the first. The dish has a metal perforated cover upon which the screw plays, which is moved by a handle of iron, which fits exactly in the upper end of the screw, which has four holes.

The plate press has two parallel screws, placed perpendicularly at a proper distance, and fixed to a strong board. A second board with two holes, corresponding to the screws, is placed on the screws, and the nuts attached afterwards. Two plates of iron, brass, or tin, are placed between the boards, and the object to be pressed, enclosed in a bag, is put between the plates, and the nuts closed by the key.

The goodness of a press depends on the goodness of the screw and nut. Both ought to be made of hard but pliable iron. If the screw is of brass, there is little friction. The worms must be strong, uniform, and well fitting; the less they rise, the more acute is the angle which they form with the horizontal basis, the stronger is the action of the screw. All other parts of the press, the dishes, covers, boards, plates,

&c., must be equally strong to afford necessary resistance to pressure, and to prevent breaking down. The key acts as a one-sided lever; hence, the longer it is, the stronger it acts. Sometimes the keys have holes in the centre, in which case they act as double-sided levers. It is requisite to be slow and uniform in pressing. Hydraulic and other complicated presses are not much used in pharmacy. Presses are chiefly used in preparing fresh vegetable extracts, oils, &c., to separate the solid parts from the liquid. To make vegetable extracts (*succi expressi*), the herbs are first divided in small parts by cutting and bruising, then enclosed in a bag, and put under the press. If the herbs are not very juicy, it is useful to wet them with a small quantity of cold water.

Expressed oils (*olea expressa*) are prepared in a similar way. Seeds, after being bruised, are exposed to the gentle heat of a water-bath or of steam, and pressed between warm plates or dishes. Some oil-seeds, however, are more advantageously pressed without heat, and it makes a great difference if some are drawn cold or hot pressed, as for instance, the oil of bitter almonds and castor oil.

Some solid fats (for instance, cocoa butter, which is not fluid at ordinary temperature,) must be hot pressed. The cocoa beans, after having been deprived of their husks and roasted, are spread on a hair sieve, and after being put in a bag, are placed over a pan of boiling water, and pressed as soon as they are warmed through between two heated metal plates ; or they are rubbed into a pulpy mass in a warm pan, or after bruising them in a warm pan, adding some hot water (two ounces of water to twelve ounces of cocoa); the mass is thus rendered a little moist, and it is pressed easily between warm plates. It is necessary at the beginning to press very slightly, but at the end of the operation, you must press with all possible strength. The residuum contains still some oil, which can be obtained by pulverizing it, and wetting it again with water. Some seeds, when old, (for instance, henbane seeds) require after being powdered, the addition of water, else they yield but very little oil. The castor seeds, after being deprived of their husks and powdered, require to be moistened with spirits of wine (one fourth of their weight). The oil, after being pressed, is exposed in a water-bath to expel the alcohol. Fresh drawn oils are turbid; they require to be left to settle for a few days, after which they are decanted. The residuum is removed by filtering.

Decantation (*decantatio*) is a simple process, by which are separated two different fluids of different specific gravity, or solids and fluids. This can be effected by inclination of the vessel. To facilitate this operation, decanting cylindrical vessels of earthenware or china are constructed, having openings at different places or heights, by which the fluid can be poured out without much shaking. This object can also be better obtained by syphons, the best of which are those which at one end have the tube bent upwards; thus, the shorter branch of the syphon is placed in the liquid, and one draws the air from the longer one without filling his mouth with the liquor. Or you may fill the syphon with fluid, and put your finger to the longer end, and plunge the other in the fluid; when you remove your finger the fluid

will flow. If minute quantities are to be decanted, the capillary attraction of cotton or blotting paper may be employed instead of a syphon. Fluids may also be decanted by means of a syringe. Two fluids are also separated by the virgin's funnel, *vulgo* separatory funnel. Pipettes are more handy than syringes. These are tubes of glass, with a round globe blown in the middle, having one end drawn to a fine point. The separatory funnel differs from a common funnel from it assuming a convex shape after its enlargement, and having a mouth closed by a stopper. It ends in a fine point.

CHEMICAL RESEARCH ON CROTON OIL.

BY M. DUBLANC.

Director of the Laboratory of the Central Pharmacy of the Parisian Hospitals.

Some interesting researches have been instituted to ascertain,—

a. Whether the croton oil contains within itself an acid volatile at a low temperature?

b. Is this acid the principle of its action, and can it be preserved if it be separated from the oil, and diminished if it be allowed to evaporate?

In order to answer both questions, the following operations have been instituted by this chemist.

The seeds of croton, deprived of their husks, ground at the mill, and subject to pressure, yield a certain quantity of oil. If the residuum be mixed with double its quantity of alcohol and pressed again, it yields a liquid which is a mixture of oil and alcohol. This liquid, when distilled, will yield more oil. Both oils are filtered, after having been allowed to settle.

The produce of this first operation is the natural croton oil, such as it exists in the seeds, which is of a brown amber colour, viscid, having a peculiar smell, and possessed of great acidity, by which, if applied to the skin, it produces an irritation varying in intensity according to its quantity, and the duration of time in which it has been applied. One drop, for instance, causes a blister in twelve hours.

If a piece of litmus paper be dipped in this oil, it turns red, and re-acts acid; and the red colour, though not deep, resists the action of the air and of a hot furnace.

The oil obtained by distillation from a solution in alcohol is rather more dark, viscid, and acid, than that obtained by simple expression.

The blue paper dipped in the oil obtained by distillation, reddens, and retains the colour under the same circumstances as the former.

The second operation, however, offers already a fact which is of great value in deciding the question about the acidity of the croton oil. If you dip the litmus paper in the fluid which is gained by distillation, no traces of a change of colour is visible; when, on the other hand, if you dip it in the oil which remains in the distilling apparatus, it changes the colour as quickly as if dipped in the oil previous to distillation.

The same is the case if the residuum is again acted upon with water or alcohol, the distilled fluid has no traces of acidity,

However, since the contrary opinion is entertained by good authorities, we must add other facts in corroboration of our own.

Croton oil was extracted by the action of ether upon the seeds. The ethereal solution containing croton oil in suspension was acid; it was placed in a glass vessel with two openings. One of them admitted a straight tube, and reached to the bottom of the vessel, admitting the introduction of external air; the other communicated with Woulfe's apparatus, composed,

1. Of a globular tube, after Liebig, containing blue solution of litmus.

2. Another globular tube filled with alcohol.

3. An angular tube in connection with a large vessel full of water, giving an inferior running to the liquid, and causing the air to pass across the thick layer of ethereal oil, to lead the volatile principles in contact with the liquor destined to retain them. The apparatus being arranged, it was put in action by causing the water to run which was contained in the large vessel. The vacuum having begun, air was introduced to the bottom of the ethereal liquid, keeping up this action till the ether was totally evaporated. Consequently, the air has agitated the liquid long enough to remove in a state of vapour all the ether which was contained in the mixture. Nevertheless, the tincture of Turnesol, which opposed the passage of the vapours of ether and water, did not change into red, which would have happened if the volatile principles should have contained any acid. Neither did the alcohol which was acted upon by the same current exhibit any sign of acid. The air saturated with ether arrived in the vessel to replace the water had no acid property; its action upon the eyelids and nostrils was pungent and irritating, but not that of an acid. Another experiment was made with the same apparatus, having always in view to cause a great quantity of air to pass through croton oil. But this time, instead of causing the current to pass through a mass of ethereal solution, it was caused to pass through pure croton oil. The large vessel was this time not quite filled with water, allowing space to introduce on its upper part two sponges, one filled with oil, the other with ether. Things being thus arranged, the liquid was set running, and the air rushed through the oil, coming in at the bottom of the liquid, and spreading through the surface, causing a lengthened ebullition. The mass of air employed in this operation was not below two centimetres. The tincture of litmus contained in the globular tube was not altered; the oil contained in the sponge was neither acid, pungent, nor corrosive. The ether acted upon by too much air had disappeared, the sponge was dry. These two proofs appear to be conclusive, and to show that the croton oil does not contain an active volatile acid, otherwise it would have been made manifest by being carried away by the ether in the first case, or by its proper volatility in the second.

Is it, however, possible to separate the active volatile principle from the mere neutral oil? It has been said by several authors that the

croton oil was composed of two different oils, but this was a mere statement which required to be proved by facts. To solve this problem, the oil employed in the experiments was obtained by means of ether. The seeds of croton yield by expression 35 per cent.; treated by ether, they yield from 52 to 55 per cent. If treated by ether, the ether obtained by distillation is free from acid, all the acid remains in the oil. When a certain fixed quantity of this oil is put in contact with ten times its weight of strong alcohol, the alcohol dissolves 6 per cent. of its own weight, and the oil 50 per cent.

The portion of the insoluble oil has lost its colour, its smell, a part of its pungency, and all its acidity.

The portion of oil which has been dissolved in alcohol, when separated from this menstruum by evaporation, is more viscid, more coloured, more pungent, and acid. The oil which is not dissolved can be acted upon again by alcohol; by this second operation, it yields some parts to the alcohol, and the remainder loses all its specific qualities. The action of alcohol upon oil in successive operation, can be followed up to its last limits.

Twenty volumes of oil mixed with 100 volumes of alcohol, will be followed by the reduction of five volumes of oil. In the next operation, when the alcohol is renewed, the volume of the columns of oil lowers only three volumes instead of five. By a fourth operation, the oil loses not a single volume. When reduced to this state, the croton oil is slightly amber-coloured, without smell, taste, or acidity; it can be taken in the mouth without causing any sensation. It is soluble in all proportions in ether. Its specific gravity is ,92 compared with that of water.

Thus we find by experiments an evident proof of the co-existence of a sweet oil with the pungent croton oil.

All the specific properties of the croton oil are carried over in that dissolved by alcohol.

Is it possible by further processes to separate these active principles from the oily matter that contains them?

To solve this question, we resorted to the following experiment:—

We took two kilogrammes of croton oil, and for several days we left it in contact with half a kilogramme of alcohol. A distinct separation took place. The upper part, composed of oil and alcohol, did not represent the exact quantity employed; which is explained by the power which the oil has to dissolve 10 per cent. of alcohol. The upper part being decanted, it was necessary to remove the alcohol, to avoid the inconvenience which might have arisen by employing heat for this purpose. Water was added to the liquid, which having become turbid, ether was added. Thus the oil came with the ether to the surface. The ether was removed by free evaporation. During this lengthened process, the effluvia were so pungent as to affect the eyes and nostrils of the operator, and cause blisters to rise on his face. The oil thus obtained is dark-brown, opaque, thick, possessed of a strong smell and acidity. Applied to the skin, it causes almost instantaneous pain, followed by a blister. It is soluble in all proportions in alcohol and ether. Mixed with nine parts of its volume of olive oil, it forms a liquid

possessing specific properties stronger than those of common croton oil.

These facts prove the mobility of the active principles of croton oil, and the possibility of succeeding, in obtaining them free from all fatty matter by chemical ingenuity, a task which will be the object of further experiments.

The results from the above experiments are the following :—

1. That the croton oil does not contain a volatile acid.

2. That the sensible acid in croton oil is fixed or retained in the oil, and cannot be separated from it by a heat at 212° Fahr., or even by distillation.

3. That the acrid volatile principle, which exists in this oil, possesses not the qualities of an acid, and has hitherto withstood the chemical operations which were instituted to extract it.

4. That the active principles of croton oil are capable of being separated from one part of the oil, and concentrated in the other.

5. That croton oil is not homogeneous in its composition, but is formed of two parts, one inert, of which alcohol is unable to dissolve more than one-tenth, and a more soluble part, which carries with it all the active principles.

6. That the greatest degree of concentration of the active principles, is by acting upon a large quantity of oil with a small quantity of alcohol.

7. That ether may be usefully employed in manufacturing croton oil.——*Repertoire de Pharmacie.*

ON THE MANUFACTURE OF SULPHATE OF QUININE.

The bark (*calisaya* by preference) to be operated upon having been carefully selected, the process of obtaining the quinine, and its conversion into sulphate, is performed as follows :—

One hundred-weight of the bark, in coarse powder, is first carefully introduced into a vessel containing about sixty gallons of water, previously heated to near the boiling point, and the whole boiled for about half an hour. Five pounds of hydrochloric acid are then gradually added, the mixture well stirred, and the whole boiled for a quarter of an hour, with constant agitation. The heat is then removed, the liquor allowed to clear, and then drawn off. A second quantity of water is next added to the residuum, and the operation conducted as before, except that in this case only two and a half pounds of hydrochloric acid are employed. A third decoction is then made, with the employment of a similar proportion of acid ; and, lastly, a fourth decoction, without the addition of any acid.

The result of this treatment with hydrochloric acid, is the solution of the quina and cinchona contained in the bark, and the decomposition of the acid kinates of the two bases, with the formation of a very soluble salt.

The vessel in which the decoctions of bark are prepared, is either of copper, lined with wood, in which case it is heated by an ordinary furnace ; or it is constructed of wood, steam heat being employed.

The liquor of the fourth decoction is used instead of water in operating on a fresh quantity of bark.

The liquors of the first, second, and third decoctions are next mixed together, and to the mixture seven and a half pounds of slaked lime, made into the consistence of cream by means of water, are then added, the cream of lime being passed through a hair sieve to keep back any unslaked particles. During this operation, the mixture must be kept well stirred to facilitate the process of decomposition.

The result of this addition of lime to the acid solution is, the saturation of the latter, with the formation of muriate of lime, which remains in solution, and the precipitation of impure quina and cinchona.

When this process is complete, which may be ascertained by testing the supernatant liquors from time to time with lime water, the mixture, after having been occasionally stirred during the next four hours, is allowed to stand for two days, or a sufficient length of time, and the solution of muriate of lime run off. The residuum having been slightly washed, is placed in a series of small filtering bags, of the shape of an inverted cone, and of the capacity of about two or three gallons. When thoroughly drained, the residuum is placed in cloths, and submitted to the action of a powerful press, by which means the whole of the remaining moisture is removed. The resulting mass is then dried, reduced to coarse powder, and placed in copper percolating vessels, of the capacity of about eight to ten gallons each, in which it is digested with alcohol. The strong alcoholic solution or tincture having been allowed to run off, fresh supplies of alcohol are added until the whole of the soluble portion has been taken up; the percolating liquors last used being employed as the first in the next operation. The alcoholic liquors, saturated with the alkaloids, are next distilled, by which means the alcohol is driven off, condensed in the refrigeratory, and collected for further use, the residuum being a dark viscous mass, composed of the alkaloids and a fatty matter, which is removed and submitted to the next operation. About seven per cent. of extractive matter are thus obtained.

By this treatment with alcohol all the soluble matters are removed, and any excess of lime and other insoluble matters left behind. Into a copper vessel of the capacity of about twelve gallons, and containing about nine gallons of water at nearly a boiling temperature, a fourth part of the residue of the distillation above mentioned is introduced, together with a sufficient quantity of sulphuric acid to give an acid reaction to the mixture, this excess of acid being necessary for the solution of the viscous residue; when this is dissolved, the remaining three-fourths are to be added in successive quantities, keeping the liquor throughout at a boiling temperature. When the whole of the residue is thus dissolved, the excess of acid is next saturated by the addition of chalk, after which about 2½ lbs. of animal charcoal are added, and boiled with the liquor, which is then filtered, there having been previously added to it a small quantity of sulphuric acid, just sufficient to redden litmus paper; the solution is then set aside to cool and crystallize.

The addition of a small quantity of sulphuric acid to the alcoholic solution, so as to have a slight acid reaction, is preferable, in order to

prevent the combination of the quinine with the fatty matter. The crystalline residue of sulphate of quinine thus obtained is then purified as above directed.

The sulphate of quinine obtained by the first and second crystallization is then drained on a cloth, re-dissolved in water, with the addition of animal charcoal, and the solution again filtered and set aside to crystallize. The residuum on the filter still contains much alkaloid; it is therefore again boiled with sulphuric acid, and the solution filtered. The liquors thus obtained are mixed with the mother liquors of the previous crystallizations, and ammonia, in slight excess, is added, by which means a soluble sulphate of ammonia is formed, with the precipitation of quina, which is afterwards treated with sulphuric acid to form sulphate of quina, or with hydrochloric, tartaric, or other acid, to form muriate, tartrate, or any other salt of quinine which may be required, or purified and sold as quina.

The cinchona, which is usually present in the bark operated upon, passes with the quina through all the processes detailed; but as the sulphate of cinchonine is more soluble than sulphate of quinine, it remains in the last mother liquors, after all the latter salt has been obtained by repeated crystallizations.

To obtain the cinchonine, 1000 or 1200 parts of a solution of common salt of sp. gr. 1116 are added to each 1000 parts of the dark mother liquor of the same specific gravity. The mixture is boiled for about ten minutes with constant agitation, and then allowed to settle. The now almost colourless liquid is then poured off, and a solution of ammonia added to it, as long as any precipitate occurs: the copious white precipitate thus obtained, is composed chiefly of cinchonine and phosphate of lime, the latter arising from the animal charcoal employed in the previous operations. The precipitate being washed, first with water, and afterwards with boiling alcohol, the phosphate is thrown down in an insoluble state, and the cinchonine is obtained in solution on cooling.

The brown precipitate formed in boiling the mother liquor with common salt, and from which the clear liquor was poured off as above mentioned, still contains some cinchonine. By re-dissolving it in water, and adding a small quantity of the dirty ammoniacal liquor obtained in treating the cinchonine as before mentioned, taking care not to neutralize the liquor completely, a brown precipitate is obtained, composed of a peculiar colouring matter, cinchonine and phosphate of lime. The solution is then filtered, and to it is added a sufficient quantity of liquid ammonia to precipate the cinchonine, which may be purified as before mentioned.

If the dark-coloured mother liquors remaining after the separation of the crystalline sulphate of quinine be treated with an alkali or alkaline carbonate, a resinous-like mass is obtained, termed chinoidine or quinoidine. If the mother liquors are simply evaporated, the product obtained is a mixture of chinoidine with sulphuric acid. A process has been patented for purifying this quinoidine, and preparing therefrom a substance, to which has been given the name of "amorphous quinine."

The purification of the crude quinoidine is thus performed:—To

three pounds of the residue of quinine manufacture (which should be soluble in alcohol, and in dilute sulphuric acid, and insoluble in water), nine ounces by measure of concentrated sulphuric acid, diluted with one gallon of water, are added, and through the solution thus formed a current of sulphuretted hydrogen gas is passed for nine hours, for the purpose of precipitating the metallic matters and other impurities. The solution is then filtered through paper, or other suitable material, and boiled to drive off the sulphuretted hydrogen, after which an alkali or alkaline carbonate is added to precipitate the chinoidine. For this purpose, about three pounds of carbonate of soda dissolved in one gallon of distilled water is employed. The precipitate obtained is then well washed in distilled water, and dried over a water-bath, the drying being finished by the employment of a chloride of calcium bath, heated to a few degrees higher than 212° Fahr. The quinoidine thus purified is now ready for the preparation of amorphous quinine, for which purpose the following process is adopted:—

Three pounds of quinoidine are well mixed with six pounds of pure sand, and digested in nine pints of sulphuric ether of sp. grav. 735; during the digestion, which continues for twelve hours, the mixture is frequently stirred. The solution is then poured off, and nine pints of fresh ether added to the residue, the process being conducted as before. The two solutions are then mixed and allowed to settle: when perfectly bright, the clear fluid is poured off from the sediment into a retort or other suitable vessel, and the ether distilled off by means of a water-bath. The residue is lastly dried in the way directed for the drying of the quinoidine as before mentioned.

An equivalent quantity of sulphuric acid may be used instead of hydrochloric acid. Naphtha, or any other solvent of the alkaloids, may also be substituted for alcohol.

The proportion of sulphate of quinine obtained in operating on the large scale, is from 3,7 to 3,8 per cent.

FACTS AND DISCOVERIES IN SCIENCE.

At a recent meeting of the Chemical Society, Professor Daubeny read a most valuable and interesting paper "On the variation in the relative proportion of potash and soda, present in certain samples of barley, grown in plots of ground artificially impregnated with one or other of these alkalies." In this paper, Dr. Daubeny communicated the results of several experiments he made at the Botanical Gardens, at Oxford, conducted in such a manner as to enable him to determine in what degree, if any, the usual quantity of these alkalies known to exist in barley, could be made to vary, by causing it to grow in a soil in which more than the customary quantity of one or other of these alkalies was present. Barley that had grown in a soil impregnated with a strong solution of carbonate of soda, or of chloride of sodium, yielded by incineration an ash, that contained somewhat more than eight per cent. more soda, than the ash of the same plant grown in a soil either unimpregnated with these alkalies, or impregnated with carbonate of potash. He considers that this notable difference in the

proportion of soda present in the ash, is occasioned by the sap, circulating in the plant at the time when it is cut, containing more soda in one case than in the other.

Barium and its compounds, more particularly the chloride of this metal, is just now attracting the attention of physicians, as applicable in diseases in which the iodides of iron and potassium, and the tincture of the sesquichloride of iron, have been administered with such decided advantage.

The salts of two other metals are likely soon to come into considerable use as articles of the materia medica. The metals alluded to are nickel and cadmium, of which the sulphates have been very recently employed with advantage by some distinguished physicians, as serviceable therapeutic agents; more particularly, it is said, in some of the diseases peculiar to females.

A medical practitioner, residing in Nottinghamshire, Mr. Bosquet, who has bestowed considerable pains in the preparation of a new form of a solution of opium, which he calls *Bosquet's Sedative Solution of Opium*, has, by permission of the President, Dr. Paris, laid before the Pharmacopœia Committee of the Royal College of Physicians, of London, some samples of his preparation of opium, which he affirms is totally different from any solution or other preparation of this valuable medicinal drug hitherto employed, and adapted for medical practice, in those cases in which the ordinary preparations of opium are inadmissible, causing head-ache, nausea, constipation, or other unpleasant effects.

The following appears to be a novel method of ascertaining the presence of salts of mercury, whether in substance or solution. If a strong solution of iodide of potassium be added to a minute portion of any of the salts of mercury, placed on a clean plate of copper, the mercury is immediately deposited in the metallic state, appearing as a silvery stain on the copper, which cannot be mistaken, as no other metal is deposited by the same means. In this way, corrosive sublimate may be detected in a drop of solution, unaffected either by caustic potass or iodide of potassium. In a mixture of calomel and sugar, in the proportion of one grain to 200, a distinct metallic stain will be obtained with one grain of the compound, though that only contains $\frac{1}{200}$th of a grain of calomel; so, too, $\frac{1}{400}$th of a grain of peroxide of mercury may be detected, although by its mixture with sugar in this proportion, the sugar is not in the least degree coloured with it. This same process acts with great accuracy with undiluted preparations of mercury; thus, the smallest possible quantity of calomel, or of peroxide of mercury, such as would almost require a magnifying lens to perceive, placed on copper, and treated with iodide of potassium, will give a distinct metallic stain. The theory of the process seems to be this: that the iodide of potassium forms a soluble and easily decomposed salt, with the various salts of mercury; or in other words, the iodide of mercury produced, is soluble in excess of iodide of potassium. Mr. Arthur Morgan has the merit of the discovery of this new test for mercury, which he has made known through various scientific periodicals.

Belladonna is likely to be brought into more extensive use than formerly, for an Italian physician has observed its extract to be of great

use in allaying or moderating the spasmodic contractions of certain muscles, and by this means severe, painful, and protracted maladies have been relieved, or entirely cured.

Chloroform has been recently found to possess a decided and powerful antiseptic property, not only over animal matter, but also over fruits and seeds. It is estimated, that a very small quantity of this article is sufficient to arrest or prevent the putrefaction of a piece of fresh meat. Experiments have been made with the view of comparing this with sulphuric ether, but this latter article does not appear to possess the property of arresting or preventing the putrefaction of animal matter, in the manner that the former does so completely.

Magnesia is spoken of as an antidote to the salts of copper, for Mons. Roucha, of Strasburg, affirms, that calcined magnesia completely checks the bad symptoms occasioned by poisonous doses of the sulphate of copper, if taken very soon after the poison; but it requires a large dose of the magnesia to overcome the effects of the sulphate of copper—he says, as much as eight parts to one of the poison; still, it is very probable, this will prove to be one of the best antidotes to all the salts of copper.

Some few years ago, Dr. Rodie, a medical officer in the British Navy, discovered the febrifuge property of the bark of Bebeeru, from which he extracted an alkaline substance, its active principle, to which the name bebeerine has been given. The experiments and observations of English physicians have since established the febrifuge and anti-periodic efficacy of bebeerine, and these justify them in the admission, that sulphate of bebeerine may be substituted with advantage for the sulphate of quinine, as much on account of the high price of the latter, as on account of the absence of all unpleasant effects on the constitution, such as head-ache, vertigo, and confusion, so common after the administration of sulphate of quinine in tolerably large doses. The bebeerine is an alkaloid, extracted from the bark and fruit of a tree growing in Guiana, known by the name of bebeeru, or sepiri.

Chloric ether has been much used in America as a disinfecting agent, some considering it the best and most convenient disinfectant. It may be burnt in a lamp like camphine. The gas resulting from its combustion in a common lamp, consisting chiefly of hydrochloric acid with a little chlorine, may be advantageously employed instead of chlorine as a fumigating agent; indeed, it has been used in this way in some of the public buildings, particularly the hospitals, with a good effect.

It is now regarded as a fact, that the solution of iodine in small quantities in water, is facilitated by the presence of tannin, for Mons. Débauque discovered that the addition of an ounce of the syrup of orange-peel to a six ounce mixture, enabled this to dissolve a small quantity of iodine without the addition of any iodide of potassium. He concluded that this property in the syrup was due to the presence of tannic acid contained in the orange-peel, and subsequent experiments with small quantities of tannic acid, proved his conclusion to be the correct one.

Few substances have attracted more attention in respect of its

peculiar physical and chemical properties, than the amorphous phosphorus, lately discovered by Mr. Schrötter. This substance affords a striking and beautiful illustration of the totally different states, termed in the language of chemical science, *allotropism*, in which one and the same body may exist. Thus, phosphorus as it is known to us, in what may be termed its normal or natural condition, is a pale-yellowish, waxy-looking, dangerously inflammable, and poisonous substance, but by the simple action of long continued heat, it is converted into an amorphous, opaque, reddish-coloured body, which may be carried about in the waistcoat pocket, and handled, or even swallowed without danger; so that the hitherto hazardous, and, at the present time, important branch of industry, the trade of the lucifer-match maker, is now, by this remarkable discovery, rendered safe and free from danger.

Carbon, as it exists in the totally different states of charcoal and the diamond, furnishes us with another familiar, yet equally striking illustration, of the same chemical substance possessing this property of *allotropism*.

All your readers are well acquainted with the appearance and properties of the metal mercury, or quicksilver, a metal so extensively useful in the arts and manufactures, in practical science, and in medicine, but few or none have visited the mines whence it is produced. Much that comes into the English market is brought from the quicksilver mines of Almaden, in Spain. These mines are said to have been known and worked since the time when Spain was occupied by the Romans. The entrance to them is a long gallery, like a railway tunnel, which leads from the valley at the foot of the ridge on which the town of Almaden is built; it is lined with freestone, wide enough to admit carts with a pair of horses abreast, and has granite footways running on either side. From this gallery other passages are cut into the rock, which is a clay slate, the matrix in which the cinnabar or quicksilver ore is found. The vein of cinnabar has an almost perpendicular dip, and its bulk is enormous. The spectacle of this vast vein is magnificent at the various working places, owing chiefly to the blood-red colour of the cinnabar, which occurs sometimes in an earthy state, sometimes in dense, large masses, and sometimes is met with in a beautiful state of crystallization. In some places, throughout the vein of cinnabar, are cavities and cracks, filled with quicksilver in its native or metallic condition. C.

ON A NEW METHOD TO DETERMINE WATER IN SOME SUBSTANCES, AND TO DEHYDRATE ALCOHOL.

BY A. GORGEU.

The presence of water in alcohol and ether can be easily detected by mixing them with benzol. If they contain water, they render it turbid; if anhydrous, they combine with the same. The only necessary condition to detect water in any fluid is, that the fluid be soluble in benzol.

In order to find out the presence of water in any fluid—for example, in alcohol—it is only necessary to bring in contact one single drop of the fluid with three or four cubic centimetres of benzol. If the drop falls to the bottom of the test tube without producing any turbidity in the fluid, the alcohol contains more than one-third of water. In order to ascertain whether the alcohol contains too much water, so as to produce turbidity, it is sufficient to add absolute alcohol to the fluid, and to repeat the experiment. If turbidity occurs, accompanied by a separation of minute drops, we may be certain that the alcohol contained in the fluid amounts, on the average, from 65 to 93 per cent. If, on the contrary, there is nothing but a cloudiness observable in the fluid, it contains scarcely more than $\frac{7}{100}$ of water. In this case, the turbidity can be made to disappear by the addition of absolute alcohol, which must be greater in quantity in proportion as the water contained in the alcohol to be tested is greater.

For this experiment, benzol is saturated in water, introduced in small, short, dry test tubes, of about twelve millimetres in diameter.

To test ether, preference must be given to oil of turpentine, which has the advantage of producing a permanent turbidity. Turpentine, on the other hand, is not employed in testing alcohol, because it is less sensitive than benzol; as oil of turpentine can produce no turbidity in alcohol of 98 per cent. By this method, 7000 or 8000 parts of water in alcohol, and 3000 or 4000 parts of water in ether can be detected.

Any substance which is soluble both in the fluid which is to be tested, as alcohol and ether, and in the fluid which is used as the test to discover the water, does not change the accuracy of the experiment, which is unavailable, however, if the first liquid contains substances which are not soluble in the second.

The property of watery ether to cause turbidity in oil of turpentine may be applied to detect hygroscopic water in salts. It is sufficient to bring them for a little time in contact with anhydrous ether, and then try whether the ether causes turbidity in oil of turpentine.

This method cannot be employed to substances insoluble in oil of turpentine and soluble in ether, or salts which are rendered anhydrous by ether, for instance,—crystallized phosphate, carbonate, or sulphate of soda. It can be used with advantage for detecting water enclosed mechanically in less efflorescent crystallized salts, such as sulphate of copper and manganese, and those which effloresce in the air, such as chloride of barium and oxalate of ammonia. In these experiments ether is preferable to alcohol, because of its greater delicacy as a test in tracing water, and because alcohol dissolves and renders anhydrous many more salts than ether.

I have turned to advantage the insolubility of water in benzol to preserve in the same unchanged the crystals of easily deliquescent salts, such as chlorides of calcium and copper, and efflorescent salts, as phosphate, sulphate, and carbonate of soda; and salts which are oxidized in the air, as the sulphate of protoxide of iron. The salts, previous to their being immersed in benzol, are dried within filtering paper, or wiped with a dry cloth.

Crystals which have been kept long in benzol, if exposed for a

while to a brisk current of air, are soon deprived of their smell, and are preserved unchanged in their composition and qualities.

Concentration of Alcohol.

Carbonate of soda is incapable to concentrate spirit containing 84 per cent. of alcohol; burned gypsum abstracts with difficulty water from the same, and the temperature of 120° Cent. being requisite to free it from alcohol, it gives back a part of the water abstracted at the onset. Carbonate of potash can be employed with more advantage for the concentration of alcohol; but to render alcohol of 95 per cent. anhydrous is very difficult; and powdered lime, left in contact for several hours with alcohol at 84 per cent., increases but slightly its strength.

The only sure method to obtain absolute alcohol, is to bring it in contact for sixteen to twenty hours with small pieces of lime, and to distil it afterwards from a chloride of calcium bath, elevating at last the temperature to 130° Cent. This distillation must not take place over a naked fire, or else the operation lasts longer, and the last parts of the distilled liquid are changed, on account of the high temperature. By means of a single distillation of alcohol of 85,6 per cent. over four-fifths of its weight of lime, one may obtain 77 per cent. of alcohol at 99,7 per cent. By means of two distillations, one over four-fifths of its weight, the other of equal weight of lime, may be obtained 70 per cent. of absolute alcohol. Alcohol at 92,5 per cent., distilled once over its equal weight of lime, gave 87 per cent. of alcohol between 95 and 100 per cent. In order to obtain 87 per cent. absolute alcohol, two distillations are necessary, one over three fifths, the other over three-fourths of lime. Common ether left in contact for sixteen hours with $1\frac{1}{2}$ of its weight of lime, and afterwards carefully distilled in a bath, gave 93,5 per cent. of anhydrous ether.—*Comptes Rendus.*

SAPONACEOUS CREAM OF ALMONDS.

(*Crême d'Amandes amères.*)

The preparation sold under this name is a potash soft soap, made with lard and perfumed with essential oil of almonds. It has a beautiful pearly appearance, and makes an excellent lather with a brush, and has met with an extensive demand as a shaving-soap, especially in Paris. It is prepared thus:—Take of fine clarified lard, 7 lbs; of potash ley, containing about 26 per cent. of caustic potash, 3 lbs. 12 oz.; of rectified spirit, 2 oz.; of essential oil of almonds, 2 drachms. Melt the lard in a porcelain vessel, by a salt-water bath or a steam heat under 15 lbs. pressure, then run in the ley *very slowly*, agitating continually from right to left during the whole time; when about half the ley is run in, the mixture begins to curdle; it will, however, finally become so firm and compact that it cannot be stirred, if the operation is successful. The soap is now finished, but is not pearly; it will, however, assume that appearance by long trituration in a mortar, gradually adding the alcohol, in which is previously dissolved the perfume.

PHARMACEUTICAL EDUCATION.

One of the grossest delusions ever devised has been industriously propagated by cunning or ignorance, or perhaps both, during the last ten years, to the effect that Pharmaceutical Chemistry is something very different from general Chemistry—something which requires an especial study—something which is not to be learned in the laboratories of our Liebigs, Grahams, and Hofmanns; something which, in fact, if true, would prove that the minor is not contained in the major. The folly and the fallacy of this delusion is so apparent, that we shall not insult the understandings of our readers by further reducing it to an absurdity. We freely admit that pill-making and plaster-spreading are not taught in chemical laboratories, for the simple reason that the art of conducting such operations is readily and most efficiently learned in the dispensary, where the primary education of the pharmaceutist properly commences, and moreover, this art is much more mechanical than chemical.

The truth is, that the most important basis of the scientific education of a pharmaceutist is a general knowledge of Chemistry,—a knowledge which involves a thorough acquaintance with the principles of this science, and not a mere insight into a few of its practical applications. For the man who possesses this general knowledge, is always equal to any of its practical applications; whereas he who is only familiar with Chemistry in one or more of its specialities, will always find himself out of his depth in attempting original research, or in applying any of the new facts with which the genius of those who, labouring in this field of inquiry, are constantly enriching this science.

The science next in importance to Chemistry for the pharmaceutist is Botany, which teaches him the history, sources, and external characteristics of an immense number of substances derived from the vegetable kingdom, which compose a large portion of the materia medica. In fact, without under-estimating other branches of knowledge, it may be said that the sciences of Chemistry and Botany are the foundation and the indispensible requisites to the existence of the proper education of the pharmaceutist.

That species of knowledge which is called materia medica, is nothing but a mere mixture of these two sciences, with a little addition of zoology and mineralogy. In all our former systems of education, it has had undue importance attached to it, because its value has not been rightly understood, and its mongrel nature has not been correctly estimated. We write these things not to dissuade the pharmaceutical student either from reading works or attending lectures on materia

medica, but simply to warn him what its true character really is, and to caution him not to rely on such sources either for a knowledge of Botany or Chemistry, as it is scarcely reasonable to expect that any one writer or lecturer can possess a perfect knowledge of both sciences; and, besides, nothing has a tendency more to perplex the student than the simultaneous study of two subjects.

Perfectly sensible are we in thus speaking of the study of materia medica,—a subject which many writers would fain but erroneously elevate into an independent science, yet which in fact is no science at all, except so far as it borrows from chemistry, botany, and zoology,—perfectly sensible are we that we are thus combating a time-honoured prejudice and an ancient conceit, which in times of yore was at least excusable, when chemistry was little cultivated and botany imperfectly understood, because medical students were then wont to cull from works on materia medica, what little knowledge they required in these respects on medicinal simples and compounds.

Tempora mutantur et nos mutamur in illis. The times are changed and the scientific pursuit of Pharmacy is no longer in the province of the apothecary; it therefore behoves the pharmaceutist, now that the division of labour has thrown comparatively this branch of the medical art into his hands, to cultivate it sedulously. Let him not trouble his head with studying the crisis of a fever, or speculating on the use of the spleen, but leave such matters to the skill of those whose lives are professedly devoted to the investigation of such topics. In short, let him, by the assiduous and successful pursuit of Chemistry and Botany, so elevate his professional reputation as a pharmaceutist, that the physician and surgeon may completely realize the conviction which is daily growing in their minds, that he is above all men best qualified to prepare the remedial agents which they, with so much ability and learning, prescribe.

"Jack of all trades and master of none" is a vulgar but truthful proverb, and is particularly applicable to our theme, for it teaches us that it is beyond the reach of human capacity for man to excel in many things; therefore we reiterate, that as Chemistry and Botany are the legitimate objects for the pharmaceutist to pursue, let him cultivate these sciences with an undivided energy, so that their successful cultivation and progress may be associated with his especial vocation.

THE PHARMACY BILL.

This Bill has been referred to a Select Committee of the House of Commons, which we do not regret; although it must be delayed in

consequence, yet we believe it will be improved by this scrutinizing process, and its necessity established by an impartial tribunal.

The clause against which we protested last month is to be expunged, and one substituted for it which will give to every member of the Pharmaceutical Society the right of directly recording his vote for the election of its governmental officers without personal attendance at the Society's house. In announcing this improved alteration, we have neither the presumption nor the desire to take any credit to ourselves for it, because it was our duty as journalists not to pass over in silence the evil tendency of the clause which is to be expunged, and because we believe that its character was palpable to many others besides ourselves; and we can only hope, for the credit of human nature, that the framers of this Bill were ignorant of the monstrous abuses likely to arise from that proxy clause. One great element of our desire to see this Bill successful is, that by its provisions every chemist will acquire the right of becoming a member of the Pharmaceutical Society; consequently, this Society will be, if the Pharmacy Bill be passed, no longer the representation of a section, be that section great or small, of the Pharmaceutists of this country, but it will in verity, as well as in name, be the Pharmaceutical Society of Great Britain. In consonance with these provisions, the fee for admission as member must be so far reduced as not to preclude, by its extent, any chemist from joining this Society. In short, the annual subscription must be then abolished, and a small entrance fee established in its place. This fee cannot be too small, so long as it is sufficient to provide a revenue to carry on the legitimate functions of the Society.

There is one provision in the Pharmacy Bill which, if not removed, is open to serious objection. The provision we allude to is that which enables apprentices and students to join the Pharmaceutical Society, without passing the ordeal of examination. We are sure that if the rising generation of pharmaceutists understand how advantageous a scientific education will be to their future success, as principals, and appreciate how valuable such education is as a source of well grounded confidence in their own capabilities, they will repudiate the charge that has been laid against them, of desiring to enter this society in a manner which is neither creditable nor profitable to them. We believe this charge is a libel upon them as a body, and upon those who are responsible for them, judging from the numbers who already have voluntarily availed themselves of the means of acquiring distinction by an examination test, and have studied hard to secure such distinction of their own free will, prompted alone by a praiseworthy ambition.

After all, we confess that we have argued this point on very narrow grounds. The real question for the statesman to consider who ventures

to legislate on this matter, is—whether it be an injustice to compel the existing body of apprentices and students to undergo an examination to test their efficiency, when it is universally admitted that such examination is for the public good? The answer to this question is, we apprehend, a decided negative. The parties most especially benefited by the education necessary to pass the examination, would be the apprentices and students themselves; for with the qualification consequent on the education, they would be able more successfully to run the race which is before them, and to compete with their seniors, whose careers were commenced in less eventful times, when the advantages of a scientific education were not absolutely necessary to ensure success.

FUSEL OIL.

This organic compound was first discovered by Scheele, as one of the distillation products of the wort obtained from the fermentation of potatoes. It has been subsequently examined by Pelletier, Dumas, Cahours, and others. It is generally now termed the hydrate of the oxide of amyl, from amyl being supposed to be its base or radical, as cyanogen is regarded to be the radical of another series of compounds.

It passes over towards the termination of the distillation process in a white turbid fluid, which consists of a watery and alcoholic solution of the fusel oil. The crude oil, consisting of about one-half of its weight of alcohol and water, may be purified, being shaken with water and re-distilled, with the previous addition of chloride of calcium. When the temperature of the contents of retort reaches 296° Fahr., pure fusel oil distils over.

Fusel oil is a colourless oily fluid, which possesses at first not an unagreeable odour, but at last is very disgusting, producing oppression at the chest and exciting cough. It has a sharp hot taste, and burns with a white blue flame. It boils at 296° Fahr., and at temperature of — 4° Fahr. it becomes solid, and forms crystals. Its specific gravity at 59° Fahr. is 0,8124, and its formula C_{10}, H_{12}, O_2. On paper it produces a greasy stain, which disappears by heat, and when exposed to the action of the air it acquires an acid reaction. Fusel oil is slightly soluble in water, to which it imparts its odour; and soluble in all proportions in alcohol, ether, volatile and fixed oils, and acetic acid. It dissolves phosphorus, sulphur, and iodine without any noticeable change, and also mixes with caustic soda and potash. It rapidly absorbs hydrochloric acid, with the disengagement of heat. When mixed with concentrated sulphuric acid, the mixture becomes of a violet-red colour, and bisulphate of amyloxide is formed. Nitric acid and chlorine decompose it. By its distillation with anhydrous phosphoric acid, a fluid, oily combination of hydrogen and carbon results. By oxidation with bichromate of potash and sulphuric acid, fusel oil yields valerianic acid, which is used in medicine, and apple-oil, employed as a flavouring ingredient in confectionery.

Reviews.

THE BOOK OF NATURE: *An elementary introduction to the sciences of Physics, Astronomy, Chemistry, Mineralogy, Botany, Physiology, and Zoology, by* FRIEDRICH SCHOEDLER, Ph. D. Edited from the Fifth German Edition, by HENRY MEDLOCK, F.C.S. London: Griffin and Co. 1851.

GRAVE are the responsibilities of those whose duty it is to provide for the education of youth; for the formation of the characters of men is much more influenced by the early training of the mind of the young, than the negligences and ignorances of their guardians and the vanities of genius will generally allow. Men, it is true, are born with unequal mental capabilities; still it is not to nature that we must ascribe the vast acquirements of our eminent men, but chiefly to their education. We know that many young aspirants for literary or scientific distinction are deterred at the very thresholds of scientific and literary knowledge, by the impassable gulf which appears to separate their mental deficiencies from the vast mine of learning imbibed by those who enjoy the rewards and honours of their industry. Let them be assured that this gulf has been passed by every distinguished mind; and, although they may be appalled at its vastness, and become weary and disheartened in attempting to stride over it, yet success is certain to him who has the courage and the industry to persevere, for there is no royal road to learning.

Although knowledge is not to be acquired, except by progressive steps, yet experience teaches us that, by suitable means, the pursuit of knowledge, which is frequently regarded as a toilsome duty, may be rendered a labour of love. One of the most valuable of these means is, unquestionably, inviting books. Books which appear to be written to amuse, with the far higher but comparatively hidden aim to instruct. Of this order of literary productions, we regard the *Book of Nature*. In fact, it is one of the best specimens of its kind that has ever issued from the press. It is an elementary encyclopœdia of the natural and physical sciences, written by a master mind, with a definite purpose and a unity of character, that must ensure its success as a vehicle of instruction for the young. Unlike works of the Grub Street school, written with similar pretences, it does not indulge in the language of exaggeration. It contains none of those over-wrought and marvellous statements, from which even the writings of Buffon were not exempt, and which were written to excite curiosity and wonder by this school of scribblers, regardless of the false information conveyed to their readers, which is worse than ignorance.

In the early education of pharmaceutical students, this work by Schoedler has a special and unrivalled value, for it treats of subjects which it is the especial duty of the pharmaceutist to render himself conversant with. In our opinion, the *Book of Nature* is the first work that should be placed in the hands of the youthful student. It will give him a zest for the study of the scientific knowledge of his pro-

fession : and not only a zest, but when he has mastered the contents of this book, he will possess no mean acquaintance with the sciences treated of therein. In short, few, whether young or old, will peruse the *Book of Nature* without deriving some advantage and pleasure that will well repay them for their trouble.

To Mr. Medlock our acknowledgments are due, for introducing this book to the English reader. He has accomplished his task, as its editor, with as much fidelity as ability. Divested, as this translation is, from anything approaching to the idiom of its German origin, the editor has nevertheless faithfully imparted to it the spirit, clearness, and beauty of Schoedler's style, and further enhanced the value of the work by appropriate editorial emendations and additions, all of which bear evidence of the extent of his attainments.

In justice to the right-minded liberality of the publisher, we should mention that the *Book of Nature* is elegantly " got up," illustrated with a profusion of beautifully-executed wood cuts, and sold at a price so reasonable, that nothing but a very extensive sale of copies can reimburse him for his outlay. We believe that, judging from the character of the translation, and the almost unprecedented sale of the original in Germany, he will have no cause to regret being its publisher.

MEDICINES, THEIR USES AND MODE OF ADMINISTRATION : *Including a complete Conspectus of the three British Pharmacopœias, an account of all the new Remedies, and an Appendix of Formulæ, by* J. MOORE NELIGAN, M.D. Edin. M.R.S.A. &c. &c. Third Edition. Dublin : Fannin and Co. 1851.

HOWEVER highly the works of Drs. Pereira, Christison, Thompson, Royle, and Neligan may be estimated by medical students and teachers, we are thoroughly convinced that a work on materia medica, especially adapted for pharmaceutical chemists, remains to be written. More than one half of the contents of these works are occupied with the consideration of therapeutics, the study of which is quite foreign to the legitimate pursuits of the pharmaceutist. In fact, the very arrangements of these books show that they are especially designed for medical students, a matter about which we have no right to murmur, however strongly we may desire to have a treatise on materia medica, written expressly for the equally important purpose of promoting education amongst pharmaceutists by the most suitable and facile means.

Medical men often complain that pharmaceutists should invade their province by dabbling in the treatment of disease, forgetting that the literature of materia medica is of such a character, that the pharmaceutist must wade through pages treating on the application of medicines to the cure of diseases, to acquire the necessary information for the scientific knowledge of his profession, which includes the botany, chemistry, physical properties, and history of the numerous articles of the materia medica. We trust that what we have written advisedly, may reach the eye of one of our learned men, competent to carry out the task of writing such a book as we have briefly indicated. As a com-

mercial speculation, it would necessarily be eminently successful, in consequence of the increased and increasing desire for knowledge amongst the rising generation of pharmaceutists, upon subjects especially within the sphere of their well-defined vocation.

After these preliminary remarks, it will not excite surprise if we take exception to the general classification of the contents of Dr. Neligan's work, under the various heads of narcotics, cathartics, stimulants, tonics, &c. &c. It leads to the unnecessary repetition of the description of many substances under these different heads, besides being to our minds not so philosophical, and vastly less conducive to a general knowledge of materia medica, than the classification of the contents of other works on the same subject, which treat on the substances derived from the vegetable kingdom in the natural botanical order of their respective sources, and those materials obtained from the animal kingdom, after the same method.

It is often asserted, that a work, which has lived to a third or fourth edition, is beyond the reach of criticism, Whether this assertion be true or not, we shall not stop to inquire; but content ourselves with remarking, that we think that a work thus favoured, should possess a freedom from error, to entitle it to an immunity from criticism. With reference to the work before us, we must observe that, however great its reputation is, and however brilliant the talents of its author may be, there are many faults and short forthcomings in it, some of which we shall briefly notice.

In writing on the chemical properties of valerianate of iron, Dr. Neligan states—

"It is composed of an equivalent of protoxide of iron and one of valerianic acid. It is insoluble in water, but is soluble in alcohol; heated, the valerianic acid is driven off and peroxide of iron left."——Page 41.

The first error here, which is palpable enough, is that the valerianate of iron consists of *protoxide* instead of peroxide of iron. Secondly, according to the best authorities, this salt is not composed of one equivalent of acid and one of base, but has the following formula:—

$$3\ Fe_2\ O_3 + 7\ C_{10}\ H_9\ O_3 + 2\ H\ O.$$

The author seldom gives his authorities for any of the statements respecting the composition of the chemical compounds treated of in his work; which is much more to be regretted, especially when writing on new compounds, such as the valerianates. The compositions of the valerianates of quinine and zinc, as represented by him, are very dissimilar to those given by chemists who have investigated these salts, as for example Wittstein, who regards the following formula as expressing the composition of valerianate of quinine:—$2\ (C_{20}\ H_{12}\ N.\ O_2) + C_{10}\ H_9\ O_3\ (H\ O) + 20$ Aq.; whereas Dr. Neligan says—

"It is composed of one equivalent of quinine, one of acid, and two of water of crystallization."

Some of the author's methods of detecting the adulteration of chemical substances are far from satisfactory. In proof of which we cite the following passage:—

"Tartaric acid is adulterated with bitartrate of potash and with lime. The former is detected by its little solubility in cold water; the latter by an ash being left, on the acid being incinerated with the aid of red oxide of mercury."

We need scarcely point out how impossible it would be to discriminate between these adulterations by the method proposed; for the lime would exist in the solution of tartaric acid as a bitartrate, which possesses about the same degree of solubility both in hot and cold water as the bitartrate of potash. Moreover, both these salts would leave an ash, on being incinerated with red oxide of mercury.

In conclusion, we shall pass over all minor errors in this work, many of which are doubtless typographical ones, (such as that at page 3, where it states that ammonia gives a brown colour to litmus paper,) and trouble our readers with only one more instance of the want of scientific accuracy in a statement of the author.

"Hypochlorite of lime is a mixture of 1 equivalent of chloride of calcium, 1 of tri-basic hypochlorite of lime, and 4 of water."——Page 337.

This passage refutes itself, for every chemist knows that a binary salt cannot be composed of other elements than those which are essential to its existence. This error, we believe, has arisen from the author confounding hypochlorite of lime with chlorinated lime. Further, we never heard before of such a compound as tri-basic hypochlorite of lime, although we are perfectly aware that chlorinated lime generally, but not necessarily, contains an excess of lime, which exists in this compound in an uncombined state, the bulk of which may be removed by its solution and subsequent filtration. There is not the slightest evidence to show that hypochlorous acid forms any other than a monobasic salt with lime.

It is the usual practice with critics to search rather for the blemishes in a work, than to point out its excellences. However unamiable such conduct may be, we believe that science and literature are greater gainers thereby than they would be from an opposite course. Such, we confess, has been our method in noticing Dr. Nelligan's book, a work which has arrived at a third edition; and consequently our praise would be as unavailing to its further success as our blame would be to retard it; therefore, if our readers desire to discover its good qualities,—and they are manifold,—we recommend them to peruse it.

OBSERVATIONS ON THE DIFFERENT ORANGE FLOWER WATERS FOUND IN COMMERCE.

BY M. LEGUAY.

There are three sorts of orange flower waters found in commerce. The first is distilled from the flowers; the second is made with distilled water and neroli; and the third is distilled from the leaves, the stems, and the young unripe fruit of the orange tree. The first may be easily distinguished by the addition of a few drops of sulphuric acid to some of the water in a tube, a fine rose colour is almost immediately produced. The second also gives the same colour when it is freshly prepared; but after a certain time, two or three months at the farthest, this colour is no longer produced, and the aroma disappears completely. The third is not discoloured by the addition of the sulphuric acid; it has scarcely any odour, and that rather an odour of the lemon plant than of orange flowers.——*Bulletin de la Société Pharmaceutique d'Indre et Loire.*

ON THE PURIFICATION OF CREAM OF TARTAR.

BY H. GAEDIKE.

The author has founded a process for the purification of cream of tartar upon an observation he had made on the solubility of cream of tartar in muriatic acid. Its solubility in this acid, diluted with more or less water is, according to the proportion of the water, always various.

One hundred parts of crystallized cream of tartar are completely dissolved by heat in seventy-five parts of muriatic acid, of a specific gravity 1,45. By standing two days in the cool at an ordinary temperature, thirty parts of cream of tartar are precipitated from this solution. Whereas one hundred parts of cream of tartar, dissolved in seventy-five parts of the same acid, diluted with one hundred parts of water, throw out, by cooling, a much greater quantity, namely, forty-two and a half parts of this salt. The same relations hold good with other quantities, as for example :—One hundred parts of cream of tartar dissolved in one hundred parts of muriatic acid, precipitate under the same treatment twelve parts of this salt; and when these one hundred parts of acid are diluted with one hundred parts of water, then twenty-two parts are precipitated. The quantity of muriatic acid which retains a maximum of one hundred parts of cream of tartar, dissolved by cooling, is one hundred and twenty-five parts, diluted with the same quantity of water.

From the above research, as well as for the fact that by mixing a concentrated muriatic acid solution of cream of tartar with water, a considerable precipitation of this salt results, it follows that the solving power of the acid is considerably diminished by water, and, consequently, that this power must be diminished as much as possible if it is to be applied to the purification of cream of tartar, by using the smallest possible quantity of muriatic acid, and by operating with the least possible amount of fluid.

In the easiest way cream of tartar is purified by dissolving one hundred parts of it in one hundred and twenty-five parts of muriatic acid, spec. grav. 1,145, diluted with an equal weight of water by the aid of heat, filtering this solution through animal charcoal to decolorize it, and then precipitating the cream of tartar from it by means of milk of lime or a concentrated solution of carbonate of soda, taking care to avoid an excess of the precipitate. 22,96 parts of caustic lime, or 115,6 parts of crystallized carbonate of soda, are necessary to neutralize one hundred parts of muriatic acid of the above-mentioned strength. It frequently happens that these quantities of precipitating agents are too much, especially when the impure cream of tartar contains a large proportion of lime, as it is necessary that sufficient acid should remain free to combine with the lime impurity. Sometimes the lime present in the cream of tartar exists only in a very small proportion, then the quantities of the precipitating agents above indicated would not be sufficient; but under all circumstances, enough muriatic acid should be free to dissolve the tartrate of lime.

To free the cream of tartar which has been treated from adhering chloride of calcium or sodium and other substances, it should be placed

in a high funnel and well washed with water, and afterwards gently dried. The gain depends on the greater or less lime contents and other impurities of crude cream of tartar, but generally about three-fourths of pure cream of tartar are obtained from the raw material. With reference to the large quantity of muriatic acid which is necessary to conduct this method of purification, it may be remarked that the operation on a large scale can be performed with a much less quantity, as in extensive operations the solution does not cool so readily during filtration. If lime be used in the above process as the precipitant, it is absolutely necessary that it should be chemically pure, or at least free from salts, which are insoluable in muriatic acid, as such bodies would remain as contaminations of the cream of tartar. The application of carbonate of soda for this purpose is the most suitable. The precaution should be observed in adding the solution of carbonate of soda not to add it suddenly, as the cream of tartar would be thereby precipitated in large crystals of a yellow colour; whereas, when the solution is added gradually, the precipitate is delicately white. The cream of tartar thus prepared is suitable for medical purposes without further pulverization. ——*Archives der Pharmacie.*

ON GLYCERINE.

BY JAHN.

The author obtains glycerine as a bye-product in the manufacture of the emplastrum plumbi of the Prussian pharmacopœia. The formula for which is the following:—Take of finely powdered litharge five pounds, and olive oil nine pounds. Boil them together over a gentle fire, constantly stirring, with the addition occasionally of a small quantity of warm water, until the compound has the consistence of plaister. Jahn boils this plaister for half an hour with an equal weight of water, keeping it at the same time constantly stirred. When cold, he pours off the supernatant fluid, and repeats the boiling three times at least with a fresh portion of water. The sweet fluids which result are mixed, and evaporated to six pounds, and sulphuretted hydrogen conducted through them as long as sulphuret of lead is precipitated. The liquid filtered from the sulphuret of lead is to be reduced to a thin syrupy consistence by evaporation. To remove the brown colouring matter, it must be treated with purified animal charcoal. However, this agent does not prevent the glycerine becoming slightly coloured upon further evaporation. It possesses also still a slight smell and taste of lead plaister, which may be removed by diluting it with water, and by digestion with animal charcoal, and some fresh burnt wood charcoal. After filtration, this liquid must be evaporated until it has acquired a specific gravity of 1,21, when it will be found to be free from smell, and of a pale yellow colour. For the preparation of glycerine distilled water is necessary, to prevent it being contaminated with the impurities of common water. Jahn obtained, by this method, from the above quantity of lead plaister, upwards of seven ounces of glycerine.—— *Archives der Pharmacie.*

ON HENRY'S MAGNESIA.

BY DR. MOHR.

In England, under this name is sold a calcined magnesia, at a very high price, which is not to be obtained in any other way. Many English travellers, as well as most of their countrymen, believe that they possess a very large knowledge of medicines, because such things as blue pills, calomel, sweet spirits of nitre, and laudanum they administer without medical advice, and bring this magnesia with them to our shops when they wish a receipt to be dispensed, which contains calcined magnesia as one of its ingredients. By such opportunities, I became acquainted with the purity and beauty of this preparation, and its peculiar silky gloss and whiteness. With a view to discover its method of preparation, I made the following research:—

By heating to redness the ordinary carbonate of magnesia, it is not to be obtained. The ordinary magnesia of commerce, which produces by a red heat a fine calcined magnesia, I exposed in a crucible, to a strong white heat. It solidified, and was of a yellow colour, and had become so hard that it was only with the greatest labour that it could be powdered and sifted. Prepared in this way, it was unuseable. I now prepared some carbonate of magnesia, observing that Henry's was very dense, without reference to that result, which was very fine, by precipitation in the heat. The process by which the flocculent magnesia of commerce is obtained, is not explained in any chemical works. Pure sulphate of magnesia, free from iron, was dissolved in distilled water, and a solution carbonate of soda added to it as long as anything was precipitated by a boiling heat. The ebullition was continued until the mixture ceased to evolve carbonic acid, and set aside for decantation. When decanted, fresh distilled water was added to the precipitate, and the whole again boiled, and afterwards placed on a filter and washed with hot distilled water, until the liquid passing from the filter gave no trace of sulphuric acid. The precipitate, when pressed and dried, was very white and dense. It was exposed to an intense white heat in a closely-covered Hessian crucible for one hour. When the crucible was opened, I found a beautifully white magnesia, finely granulated. Where it had come in contact with the crucible, it had acquired a yellow colour, from the peroxide of iron contained in the crucible. The yellow portion alone adhered firmly to the crucible, and the rest was perfectly white, and readily removed. In acids, this magnesia was with difficulty dissolved, although ultimately completely soluble therein. By a repetition of this process, an identical result was obtained. The magnesia thus produced in small lumps exhibited by transmitted light a slight rosy tint, and by reflected light, a very white colour. In these respects, it agrees perfectly with Henry's. To determine its comparative density, a cubic inch measure was filled with its powder, and weighed. As the results of three trials, it contained respectively 10,74, 11,19, and 11,18 grammes of the powder. Two experiments with Henry's magnesia gave 7, and 7,2 grammes. Three of the carbonate of magnesia, prepared by heat, gave 12,68, 12,9, and 12,5 grm. One of the ordinary calcined magnesia gave 1,985 grm.; and one of the ordinary carbonate of magnesia, 1,4 grm.

The calcined magnesia, as above prepared, contains some hard particles, which are very difficult to pulverize. In attempting to powder them, I remarked that this magnesia, which was washed before being burnt until no traces of sulphuric acid could be detected, now afforded an evidence of a small portion still being present. This same observation I have previously made in the preparation of oxide of zinc. To remove this contamination, I recommend that carbonate of magnesia should first be lightly burnt, and then well washed with hot water, and again burnt with a very strong heat.

The above determinations of the density of the magnesias must not be confounded with their specific gravity. To ascertain the latter is a task of great difficulty, for Rose, in attempting it, obtained such discrepant results, that he has withheld them, The specific gravity of Henry's magnesia, as near as it could be ascertained, is from 2,50 to 2,67. The magnesia prepared according to my process, gave 3,148 as its specific weight.——*Buchner's Repertorium.*

ON THE PRESERVATION OF FRUITS AND THEIR JUICES BY THE APPLICATION OF STEAM.

BY MAYET.

The author has previously proved by a research, that the heat of steam destroys the ferment in fruits, so that they may be preserved for a long time. To learn when this point has been reached, it is necessary to know how high the temperature rises in the fluid enclosed in the bottles when they stand shut up in a room the atmosphere of which has been heated to 184° Fahr., and to learn the time requisite as well as the degree of heat which is necessary for the destruction of the ferment.

The results of his researches teach, that in no instances the fluid contents of the bottles which were placed in the steam-room reached the temperature of their surrounding atmosphere, until they had stood, at the very least, an hour in it. In glass bottles, the influence of the heat was quicker than in stone-ware.

From the commencement of the operation, that is, when the fire is first applied to the steam-apparatus, nearly half an hour is required before the temperature of the steam-room is reached by the contents of the bottles, when they hold about two pints, and are made of glass. When made of stone, double that time is necessary. These results arise from each kind of vessel requiring a different quantity of heat to raise it to the temperature of the steam-room, consequently, the steam room does not arrive at a temperature of 184° with the same quantity of fire with each kind of vessel, When this temperature has been reached in the steam-room, the contents of the glass bottles will be at 164°, and those of the stone-ware ones at 86°.

Mayet's researches show that fruits and their juices do not require a temperature of 212° Fahr. to preserve them, and that 184° is sufficient to destroy their ferment, but that care must be taken to ascertain that contents of the vessels have really reached this temperature.——*Journal de Pharmacie.*

ON THE POISONOUS PRINCIPLE OF THE TOADSTOOL.

BY APOIGER.

The fruitless researches of Le Tellier, Vauquelin, Braconnot, Schrader, and others, to isolate the poisonous ingredient of the toadstool (amanita muscariæ), induced the author to undertake a chemical examination of this substance.

By pulping this substance in a mortar it evolves its peculiar smell. Its pulp, which tastes saltish and reddens litmus paper, after being expressed, was macerated with water for eighteen hours. The liquid was then expressed from the pulp, which was repeatedly treated with water in a similar way, until the fluid separated from it gave no turbidity with acetate of lead. The different fluids produced were mixed, and acetate of lead added to the mixture as long as anything was precipitated. The liquid separated from the precipitate by filtration was distilled until one half of the liquid had passed into the receiver. The contents of the retort had now the odour of osmazome, and those of the receiver possessed an acid reaction and the odour of the toadstool. Apoiger could detect no poisonous property in either of these products, although the distilled fluid gave a precipitate with tannin, which was a combination with a base possessing the smell of conia.

The precipitate obtained by acetate of lead after being washed was mixed with an equal volume of water, and decomposed by sulphuretted hydrogen. The fluid was then filtered from the sulphuret of lead, and subjected to distillation until one-half had passed over. The distillate smelled of the toadstool, and was without reaction on litmus or turmeric paper. The residue in the retort was evaporated to an extract which possessed an acid reaction, and shewed, after a few hours, hygroscopic properties. When treated with ether, a solution was obtained which, by spontaneous evaporation in the air, left a saline crust of crystals, the form of which could not be determined. This crust was slightly soluble in water, and when decomposed with caustic potash evolved strongly an agreeable smell of mushrooms.

The extract exhausted with ether was treated with alcohol, which dissolved a considerable portion of it. The residuum was soluble in water. These solutions were mixed, and precipitated with nitrate of lead. The resulting precipitate treated with sulphuret hydrogen, set free boletic and fungic acids. The fluid filtered from the sulphuret of lead, when evaporated to dryness, produced a dark brown mass, which, when given to a kitten six weeks old, produced death.

Three grains of the above-mentioned crust also produced death in a few minutes in a kitten. Apoiger fed a dog on the original residuum from which the above substances were extracted, without any detrimental results to its health, which shows that the poisonous ingredient of toadstools is removed by expression and their subsequent maceration in water.

Buchner remarks, with reference to the researches above detailed, that the author has shown, without doubt, that the juice of the toadstool contains a poison which is precipitated by neutral and basic acetates of

lead, and that from the lead compound it may be set free by sulphuretted hydrogen, in a form that is soluble in ether and crystallizable out from that menstruum. He also thinks that it is probable that the poison is an organic base in combination with boletic and fungic acids. ——*Repertorium für die Pharmacie.*

FORMULA FOR COMPOUND FLUID EXTRACT OF SARSAPARILLA.

In the last edition of the London Pharmacopœia, a formula was introduced for making simple fluid extract of sarsaparilla. This was a step in the right direction, because when a preparation has become extensively employed by the medical faculty as a remedial agent, it is politic that there should be a recognised formula for its preparation, emanating from the highest authority, to ensure uniformity of strength and composition. The College of Physicians were probably not aware that the compound fluid extract of sarsaparilla is even more extensively employed than the simple extract, or, possibly, they would have considered it consistent with their duty, as compilers of the Pharmacopœia, to have given a formula for its preparation.

The process usually followed for preparing the compound fluid extract is open to a serious objection, arising from a boiling temperature being used to extract the active soluble matter from the ingredients, which dissolves out at the same time all the feculent matter. This feculent matter being separated by the addition of spirit to the fluid extract, which spirit is employed for the purpose of preserving it, is a source of great waste and partially destroys the elegance of the preparation. To remedy these disadvantages, the following formula is recommended:—

Take five pounds of bruised Jamaica sarsaparilla; ten ounces each of cut sassafras, of rasped guaiacum, and of cut licorice root; three ounces of mezereon, and a sufficient quantity of cold distilled water to completely cover the above substances when placed in a vessel. Infuse them for twenty-four hours, occasionally stirring the contents of the vessel, and then pour off the liquid. Repeat this operation with fresh portions of distilled water until it ceases to extract any flavour from the ingredients. The several liquids obtained by these infusions must be filtered or decanted to render them clear, and afterwards evaporated by boiling until the whole is reduced to thirty-six ounces. When this fluid extract is cold, four ounces of alcohol must be added, to preserve it. One ounce of the compound fluid extract thus prepared is equal in strength to sixteen ounces of the compound decoction of the Pharmacopœia.

CAVENDISH SOCIETY.

The Annual Meeting of this Society took place on the 1st March last, under the presidency of Professor Graham. The Annual Report afforded evidence of its increasing prosperity. The Council has made arrangements to publish, during the present year, the second volume of Lehmann's Animal Chemistry, the first volume of the Organic part of Gmelin's Chemistry, and, if possible, a volume of Bischof's Elements of Chemical and Physical Geology, a work which has no competitor, being unequalled in the extent and value of its information.

NEW METHOD OF TESTING INDIGO.

BY ROBERT LINDENLAUB.

This method is founded on that by Bollay, who effects determination of the value of indigo, by means of chlorate of potash. The author proposes to decompose the chlorate of potash with sulphate of soda. The solutions required for this method are to be prepared in the following manner:—

1*st.*—*Solution of Sulphate of Soda.* Dissolve 100 grains of crystallized carbonate of soda in 500 grains of water, and saturate this solution with sulphurous acid, prepared from 100 grains of copper and 400 grains of sulphuric acid.

2*nd.*—*Solution of Chlorate of Potash.* Four grains of dry chlorate of potash are to be dissolved in so much water that solution shall measure 400 cubic centimetres.

3*rd.*—*Solution of Indigo.* One gramme of finely pulverized indigo is to be dissolved in ten grammes of fuming sulphuric acid, and diluted with water to 200 cubic centimetres.

In employing this method a graduated pipette is required, 100° of which shall be equal to fifty cubic centimetres. This quantity of the indigo solution is to be diluted with 200 cubic centimetres of water, and heated in an evaporating dish to about 120° Fahr., and then mixed with fifty cubic centimetres of the sulphate of soda solution. To this mixture the solution of chlorate of potash must be added, by drops from a bottle, until the colour of the indigo is completely destroyed. The best way to ascertain correctly whether the colour has been entirely discharged is, from time to time to dip a strip of paper into the liquid, and hold it towards the light. The drops of chlorate of potash solution must, near the close of the operation, be very carefully added; their effect can be readily observed if they are allowed to run down the side of the evaporating dish. The result may be controlled by a second experiment.——*Journal für Praktische Chemie.*

COMPOUNDS OF ALBUMEN AND ARSENIC.

To the Editors of the Annals of Chemistry and Pharmacy.

Gentlemen,

Being too busily engaged at present with most important professional matters, it is impossible for me to enter into a new set of experiments upon the vexed albumen and arsenious acid controversy. In justice, however, to myself, I must answer a few of the statements put forth by Mr. Herapath, of Bristol, in your last journal. I am sorry that I do not know Professor Herapath personally; he is one of the few celebrated *chemists* that I have not seen. I have underlined "chemists," as it is a word so frequently adopted by presumers at the present day.

I beg to state, I did not insinuate that Mr. Herapath had taken up the question for the sake of notoriety; the insinuation referred to others who could not take it up for any other reason. It was either for the sake of notoriety, or on account of excessive vanity. "I fight for *truth*, not for victory," Mr. Herapath writes; "Dr. Muspratt should bear in mind that solution is not decomposition." I scarcely know to what this refers. I contend that plate-glass, being slightly soluble in water,

is quite an analogous case to the albumen compound. Both are soluble in boiling water; *neither are decomposed.*

Mr. Herapath alludes to my not mentioning "the action of the so-called arsenite of albumen, on the animal economy." *I have repeatedly stated* that it is not poisonous, to which statement I still adhere; and if Mr. Herapath will properly prepare *the compound*, he will also find it innocuous.

If I am wrong, I am wrong in very eminent company. In conclusion, I have only to add that white of egg contains *free alkali*, which combines with the arsenious acid; consequently, if Mr. Herapath get a poisonous compound, it is the *arsenite of potassa*, and not the *arsenite of albumen*.

Yours respectfully,

SHERIDAN MUSPRATT,
Dr. Phil., F.R.S.E.

TO CORRESPONDENTS.

Newbury.—1. Gun-cotton is made by steeping one part of cotton wool in a mixture of 20 parts of nitrate of potash in powder and 30 parts of strong sulphuric acid, for not longer than five minutes. The cotton must be constantly stirred whilst in the mixture, and when taken out of it, well washed in plenty of water until it loses all trace of acidity. Afterwards it must be dried carefully, at a low temperature. 2. Fusel oil may be obtained at the distiller's. For its characters, see page 116.

Mr. Owen, Dublin.—You are no doubt correct in your criticism on that formula.

A Subscriber.—1. We are not aware of the existence in the English language of any practical treatise on the manufacture of perfumery. 2. Parnell's "Applied Chemistry," second edition, contains an excellent article on the art of dyeing.

A Constant Reader, Wolverhampton.—For the manufacture of glycerine, see page 122, of the present number.

Received.—"A Letter to Sir George Grey, on Medical Registration and the present condition of the Medical Corporations, by EMERITUS."

An Artist, Chelsea.—Fabrics are dyed Turkey red by means of an alum mordant and a madder bath.

X. O. X.—1. See page 126. 2. Dissolve citrate of iron in water, and saturate the solution with carbonic acid by pressure. 3. Not in our province. 4. Compound syrup of sarsaparilla. 5. Soap wort, two ounces; water, four pounds; boil to two pounds. 6. Gum arabic, one pound dissolved in one pound of water, and mixed with eight pounds of simple syrup. 7. Purchase Beasley's Formulary, which contains all the particulars of the above formulæ.

Mr. D. King, Bristol.—For almond shaving cream, see page 112, of this Journal.

W. D. Y.—1. The quickest method to freeze water without the use of ice, or an air-pump, is to drench finely-powdered sulphate of soda with strong muriatic acid, and place a tube containing water in this mixture, when the water will be speedily frozen. 2. A gramme is equal to nearly fifteen grains and a half.

Mr. J. Gough.—Compendium of Materia Medica and Pharmacy, by J. Hunter Lane, M.D.

Mr. Burn, Brighton.—Practical Pharmacy, by Mohr and Redwood, which contains numerous woodcuts.

An Apprentice, Manchester.—Yes; although we candidly confess that the future welfare of the apprentice would be much better consulted by compelling him, where compulsion is necessary, to study so as to enable him to pass an examination, the passing of which would reflect both credit and benefit on himself.

W. Y. G.—1. Dutch drops consist of balsam of sulphur. 2. A Table, by Button and De la Rue, price 2*s*. 3. Vestiges of the Natural History of Creation, cheap edition, 5*s*.

Tyro, Shaftesbury.—See page 116, for an account of Fusel Oil.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG,

Professor of Chemistry at the University of Giessen.

No. IV.

The Mixing of different Bodies.

The mixing of different medical ingredients is, in many cases, a very simple operation; some cases, however, require more attention, as in mixing there often occurs some chemical combination; and consequently, such cases ought most properly to be treated under the head of chemical operations. However, we are obliged to mention here all operations in which the mixing forms the principal object, and the chemical combination the secondary one.

Species are a mixture of different organic substances previously cut, or coarsely pounded, such as roots, herbs, flowers, barks, woods, fruits, seeds. The mixing is effected by the hand. The larger quantities are mixed first, afterwards the smaller ones. The ingredients must be mixed as uniformly as possible. If camphor or ethereal oils are to be added, they ought to be previously dissolved in spirits of wine.

Species for tea consist in coarsely cut roots and herbs; and all dust and fine powder must be removed from them.

Species, for fomentation, must be cut finer, and species for cataplasms must be in a coarse powder.

The compound powders (*pulveres compositi*), are made by rubbing the different ingredients together in a mortar; they must be mixed very evenly. Fine powders must be rubbed long enough, so as to present to the naked eye an uniform mass. First, rub the less quantities, and add afterwards, by degrees, the larger ones. If extracts or adhesive substances form part of the compound, mix them previously with the dry substances, or with a little sugar, and add afterwards the other ingredients.

It is not always proper to dry the extracts previous to mixing them with powders. Some aromatic substances—for example, musk—do not admit of drying. The physician ought to know well the proportions in which certain substances mixed together will admit to be dispensed as

powders, or else he will find his powder to be wet, or even formed into a mass fit for making pills rather than a powder. Deliquescent substances, such as tartarus boraxatus, potassæ acetas, ought never to be prescribed as powders. Powders must be equally divided, and dispensed in separate papers.

Formerly, some compound powders were called species, such as species diatragacanthæ, species diaireos; those which are still in use, are classed now under the head of pulveres compositi.

The eleosacchara, are sugar, imbibed with ethereal oils; since these oils are either volatilized, or undergo many changes through mixing, they ought never to be dispensed otherwise than according to magistral formulæ, the physician prescribing always exactly the quantity of oil and sugar to be employed.

Eleosacchara of lemon and orange are generally prepared by rubbing the sugar against the fresh rind of the fruit.

Conservæ.—Preserves are mixtures of sugar and fresh herbs or flowers. The fresh parts of vegetables are reduced to pulp by pounding them in a stone mortar, and adding to them a prescribed quantity of sugar.

Electuaria.—Electuaries are mixtures of powders and sugar, or syrups and honey, to form masses of moderate consistence. The consistence varies according to the intention of the physician; it is called *tenue*, when it flows easily from the spatula: the common electuaries are firmer, and do not run from the spatula if kept in the air transversely.

The preparation of them is very simple. First, the powders are mixed, afterwards the syrup added. If extracts are to form part of the electuary, they are first mixed with the syrup. The proportion of syrup to the powders varies according to the specific nature of the last. Powders of fibrous vegetable substances, roots, barks, &c., require three-fourth parts of syrup. Powders which attract much moisture, and are very light, require often six parts of syrup; on the other hand, gums and other substances which are soluble in syrup, require much less. Earthy and heavy metallic substances require less than one-half of syrup. However, the last substances ought never to be administered in electuaries, because they fall to the bottom, even in one of firm consistency, and form thus an unequal mixture. Electuaries containing fibrous substances ought to be made softer as they are apt to become hardened by keeping.

Most electuaries are subject to a fermentation, which, however, is not injurious if the electuaries are properly made. They ought to be kept in cool places, and at first not closed up too tightly. As all electuaries are liable in a short time to spoil, it is better not to make them in large quantities.

At present, electuaries are only made after magistral prescriptions. Opiates, confections, and marmalades belong to the class of electuaria.

Boli.—Boluses differ from electuaries only on account of their shape and consistence. Powders mixed with honey or syrup are made into a stiff mass, and dispensed in the shape and size of bullets.

Pilulæ.—Pills are small globules from the size of a peppercorn to that of a pea. They are prepared of all sorts of substances, reduced to

a fine powder, and mixed by means of an extract into a stiff paste, difficult to be kneaded, called pill mass. The mass is made by a pill machine into cylinders, and cut into pills. The sticking of the pills is prevented by causing them to roll in a powder. If no specific powder is prescribed for this purpose, pulvis lycopodii (powder of club moss) ought to be used.

Great care must be taken in making pills, since substances are often prescribed for making them, which by all care will not hold together. Physicians often omit a good binding medium, or prescribe too much or too little of it; so that, by following their prescription, instead of massæ pilularum, you have a wet powder, or an electuary. In such cases, the chemist is obliged to make up the deficiency according to his own knowledge, and as this may be different in different subjects, the patient is exposed to have, instead of the intended remedy, products of the most different nature.

To prescribe a new formula for pills requires great practical pharmaceutical knowledge, particularly a knowledge of the form and nature of the ingredients prescribed. Since all sorts of things are prescribed to be made up in pills, it is difficult to give general rules upon this subject. However, it may be safely taken as a rule, that whenever oils, resins, or any other substance which does not easily combine into a mass, be prescribed for making pills, that it is necessary to add to it a corresponding quantity of binding medium. Vegetable extracts are more useful for that purpose than syrups or honey. If the powders of which pills are to be made are full of vegetable fibres, the best mode is to bind them with a thick extract. In this case, it would be better for the physician to prescribe rather less than the required quantity of extract, which could be rendered more ductile by the addition of water. If the powders consist of earthy or metallic substances, or salts, very little extract is required. If the powders contain much mucilage, a few drops of water will suffice; if they contain much resin, spirit of wine or a spirituous tincture will be sufficient. In this case, the physician abandons this point to the discretion of the chemist, and sometimes does the same with regard to the extract. This discretional power has both its good and its bad side. If the physician knows how much you may take or not of the extract or fluid, it is all right; but if he does not know it, and the chemist is obliged to add much more or much less than the prescriber fancies, in this case the patient has a dose quite different from that intended by the physician, an occurrence of the greatest consequence with strong remedies. Hence, in such cases, it would be better if the prescriber would prescribe only the number of pills to be made from a certain prescribed compound, and allow the chemist to bind up the mass at his discretion. If the physician has not entirely overshot the mark, so that by making as many pills as he prescribed, the chemist is not obliged to compound boluses or to dispense homœopathic globules, the patient is safe. It must be well understood that this is to be allowed where the powders are made of the most active principles, and the binding extract of a neutral or indifferent one. The contrary must take place if the extract prescribed is the most powerful drug, as copaiba, turpentine, or even a narcotic. In

these cases, the dose of the extract must be carefully marked down by the prescriber, and discretion to add more or less of the powder to be granted to the chemist.

The goodness of a pill mass depends, first, on the uniform mixture of its ingredients; heterogeneous particles ought not to be traced in it either by the eye or by the touch: secondly, that it be strong, but at the same time ductile and plastic; the more worked upon the better it is; a mass which is too moist, gives pills which soon stick together. The mass for pills is worked up in mortars, of metal or iron; with caution, even stone and composition mortars may be used. Brass mortars are of little use, because of their becoming soon worn, and being easily corroded by various substances, particularly by sulphur and quicksilver, which ought never to be worked up in them. Substances easily deliquescent in the air ought never to be made into pills; but should pills containing these substances be prescribed, they must be kept in well-closed glass vessels.

Pills to be perfect must be of firm consistence, perfectly round, and of equal size. Instead of using powder, sometimes pills are gilded or silvered. The operation of gilding is performed by means of a spherical box, divided into two hemispherical halves. A few leaves of gold or silver are placed in one hemispherical half, twelve to twenty pills yet moist are placed over the leaves, and covered afterwards with the same quantity of leaves, and the box closed with its other half. The box is then moved quickly with a rotatory action, and after working them a little in this manner they will be found perfectly gilded or silvered.

Wax sponge.—Sponge cerate is prepared by immerging sponges cleansed from all impurities. into melted wax, and pressing them afterwards between two heated metal plates. Prepared sponges are preferable to wax sponges, to obtain which, fine, not too thick, and rather long sponges are chosen, which are immersed in a thin solution of gum arabic, and afterwards bound closely with string all their length, so as to press them into fine cylinders, which are left to dry.

Some salves and common plaisters belong to this class, but since in most of them chemical changes occur, we shall treat of them among the chemical operations. Chemists ought to understand how to tin their own utensils. The inner surface of copper kettles and pans is covered with a coating of tin. For this purpose, pure melted tin is poured into the vessel, previously cleaned and dried, a little quantity of powdered muriate of ammonia is added to it, and the mass spread evenly by means of a ball of tow. This operation requires great care in regulating the heat and spreading uniformly the metal.

Salting.—To preserve fresh flowers and aromatic herbs, they are placed in layers in tubs, barrels, or jars, sprinkling each layer with salt, and pressed.

The cutting of labels, labelling, packing, forming bags, lining and covering boxes, making filters, &c., belong to the mechanical operations, which can be better learned by practice, than by any, even the most graphic, description.

A METHOD OF TREATING "GROWN" OR "SPROUTED" CORN.

BY WALTER HEMINGWAY.

A PAPER in a recent number of the "*Annals of Pharmacy*," on the adulteration of bread, has reminded me of an operation I performed a few years ago on some "sprouted wheat," and which, if thought of sufficient interest, the editors are at liberty to publish. Some eight months after a very wet harvest, I was staying at the house of a friend who is a farmer in West Sussex; the wheat had been greatly damaged, and a sample was shown to me, for which at market no bidder could be found, it was offered at £.6 a load and refused; the price for good wheat at the time, being £.9. By "grown" wheat is to be understood, a mixture of good and bad grains, and in this most indifferent specimen, the proportion of germinated corns was about one third. All conceivable mechanical means, such as sifting, winnowing, and shaking in a variety of ways have, I learned, been resorted to, in order to effect a separation, but to no purpose, and the farmer has been left without remedy, and the public to the annoyance of unwholesome bread. Now, as the grown or germinated corns are specifically lighter than the sound, I inquired if it was likely that they would swim in water, the experiment was tried, but did not answer, the whole sinking instantly; it then occurred to me to increase the density of the water by means of salt, and I afterwards had the satisfaction of seeing the heavy or sound wheat remain at the bottom, while the grown, spongy, and otherwise imperfect grains, floated and admitted of easy separation; both kinds were well washed to remove the salt and dried, and I had two samples, one pronounced better than good wheat usually is, and worth from £.9 to £.10 a load, the other all damaged, but worth about £.4 a load, for feeding poultry and cattle. Subsequently I amused myself by operating on a larger quantity (several quarters) and the whole family were of opinion that they never had such nice bread; and indeed it stands to reason that it should be so, for everything but the heaviest and soundest wheat had been rejected. Accustomed as I am to chemical operations and to processes of various sorts, I am satisfied that the method is both practicable and inexpensive; little besides labour would have to be provided, for there is not much waste of brine, and when too dirty for further use, it is still valuable as manure. The malting houses of the country seem to me also admirably adapted for carrying out the plan, being provided with the two requisites, water and a kiln, a brine vat and two rinsing tubs being the only additional apparatus required; the actual cost I have calculated at from ten to twelve shillings a load.

Were no other advantages gained than those of improving the quality of a staple article of food, and making bakers independent of alum or its substitute, there would be justification in resorting to a beneficial system; but in an economical point of view, the process is, I think, deserving of much attention. For suppose a farmer with a quantity of wheat similar to that which I have alluded to, what would be his case? he could send it to the maltster to be cleaned, and for every three loads,

the malster would return to him two loads of most excellent wheat, and one load of sprouted, charging him twenty shillings a load for cleaning; the two loads at £.9 10*s.* a load, would be worth £.19, the one load £.4, together £.23, whereas, previously, £.18 could not be obtained for the whole, so that after paying expenses, there would be a clear gain of £.2 on three loads of wheat when the price for good wheat is £.9, and the profits would be larger as the value increased.

PORTMAN STREET, PORTMAN SQUARE.

COMBINATIONS OF CARBONIC ACID AND WATER WITH OXIDE OF ZINC.

BY H. ROSE.

OXIDE of zinc forms with carbonic acid and water a greater number of compounds than the neutral salts of magnesia, lead, copper, cobalt, and nickel, when precipitated with carbonates of the alkalies. There are, in consequence, only a few compounds of carbonic acid with metallic oxides and their hydrates, which are neutral, and which possess the power to resist the further action of water.

By the precipitation of sulphate of zinc with carbonate of soda, a multitude of combinations are formed possessing a constitution between carbonate of zinc and hydrate of oxide of zinc, which change their composition by drying, attended with expulsion of carbonic acid through the action of water.

When concentrated solutions in equivalent proportions of these salts are mixed in the cold, a precipitate falls with the constitution, 2 Zn O, $C O_2$ + 3 Zn O, H O + H O, which, by drying, is changed to 4 Zn O, $C O_2$ + 7 Zn O, H O + H O.

The latter compound is precipitated when diluted solutions of the salts are employed. From very diluted cold solutions, and also from boiling hot concentrated solutions, is obtained the precipitate Zn O, $C O_2$ + 2 Zn O, H O, combined with various quantities of water. An excess of carbonate of soda produces in the cold, and by somewhat high temperatures, a compound which contains rather more carbonic acid.

By the preparation of very large quantities according to the process prescribed by the Prussian Pharmacopœia, at rather a higher temperature, a precipitate is obtained with the simple constitution Zn O, $C O_2$ + Z O, H O.*

When bicarbonate of soda is used to precipitate sulphate of zinc, compounds are obtained which are richer in carbonic acid. These cannot be dried, even by an air-pump, without the loss of much carbonic acid, and the formation of the combination 2 Zn O, $C O_2$ + 3 Zn O, H O + H O. When the precipitation is effected, by an excess of

* Take of purified carbonate of soda two and a half pounds, dissolve in thirty pounds of water, and filter. To this solution add, with agitation, two pounds of sulphate of zinc dissolved in six pounds of water. When this mixture has stood for some time, the resulting precipitate is to be washed and dried at a gentle heat. —*Prussian Pharmacopœia.* [*Eds. of Annals, &c.*]

bicarbonate, in the cold, there results a compound with the formula 4 Zn O, $C O_2$ + 5 Zn O, H O, H O. By operating on large quantities at a higher temperature, the precipitate is composed of 2 Zn O, $C O_2$ + Zn O, H O. To obtain a compound with the largest amount of carbonic acid, namely, 12 Zn O, C_{02} + 3 Zn O, H O + 5 H O, it is necessary to precipitate, with an excess of bicarbonate of soda, in the cold, and to collect the compound by letting the solution stand for some time, and without washing it. By drying it at 212° Fahr., this compound evolves no carbonic acid, but loses water, and becomes 4 Zn O, $C O_2$ + Zn O, H O.

The neutral compound of oxide of zinc with carbonic acid can only be obtained by mixing a solution of sulphate of zinc in the cold with a great excess of a concentrated solution of bicarbonate of potash; the precipitate must be allowed to stand until it becomes thick, then washed with a solution of bicarbonate of potash, and afterwards pressed between filtering paper, when it has the constitution 2 Zn O, $C O_2$ + 3 H O. It does not change by being washed with cold water, but when dried in the air it becomes 4 Zn O, $C O_2$ + 5 H O. Dried at 212° Fahr., it retains its carbonic acid, and a portion of its water. Its composition then is 4 Zn O, $C O_2$ + H O, and it is worthy of remark, that when exposed to 392°, it does not lose carbonic acid, nor yet all its water, but possesses the composition 5 Zn O, $C O_2$ + H O.

So strongly is the carbonic acid combined with the oxide of zinc and its hydrate, that these compounds only lose completely their water and carbonic acid at a temperature of 572° Fahr., when pure oxide of zinc remains. In this case, the carbonic acid is driven off by the action of the water, as at lower temperatures. The artificially prepared carbonate of zinc behaves, by elevated temperatures, the same as the natural compound, which retains its carbonic acid at 392°, and loses it slowly at 572°. While the carbonic acid is expelled by heat alone at 572°, yet water acting on the pulverized mineral will, at boiling heat, drive it off.

ON THE PRESENCE OF BORACIC ACID IN THE WATER OF THE BOILING SPRING AT WIESBADEN.

BY DR. R. FRESENIUS.

Boracic acid until now has never been found except in tincal and a few other minerals, in the hot lakes or *laguni* of Tuscany, and in the brine at Strassfurth. In the multitude of analyses of mineral waters, both of the present and past times, this substance has not been sought for, because its reaction with spirit and sulphuric acid is not sufficiently delicate to detect the small quantities of boracic acid, which, if present at all, could be contained in them.

H. Rose has, in the new edition of his work on analytical chemistry, given a method to detect boracic acid which is more delicate than the spirit test, and which consists in treating borates with hydrochloric acid, and bringing in contact with this mixture a piece of turmeric paper. If boracic acid be present, the paper when dried will become brown.

Having tried this method and found that this characteristic colour is produced on turmeric paper when one part of crystallized borax is dissolved in 1000 parts of water, I proceeded to ascertain if the water of this hot spring contained boracic acid, believing such to be the case from its high temperature, which is an indication that it is of volcanic origin.

I evaporated thirty pounds of the Wiesbaden water in a copper vessel, having first rendered it strongly alkaline with pure carbonate of soda. When it was reduced to between one and two pounds it was filtered whilst hot into a porcelain dish, the contents of which were saturated with hydrochloric acid, and evaporated to one-fourth. The common salt, which had crystallized out, was then separated from the liquid by filtration whilst hot. The filtrate, which contained a little copper, was acidified with hydrochloric acid, then saturated with sulphuretted hydrogen, and set aside for twelve hours, and afterwards filtered. The resulting fluid, when tested with turmeric paper in the manner above described, produced a slight brown colour, which, however, was not satisfactory. The fluid was therefore again saturated with a slight excess of carbonate of soda and evaporated until about an ounce remained, which was filtered whilst hot. The filtrate, after being made strongly acid with hydrochloric acid, was tested with turmeric paper, which upon being dried at 212° Fahr. became changed distinctly to the characteristic red-brown colour, in the same degree as with a diluted solution of borax. I now evaporated two-thirds of the solution resulting from the mineral water to dryness. To the residuum was added sulphuric acid and alcohol. When this mixture was heated and inflamed it burnt without the expected green colour; however, when the flame was blown out and the liquid again ignited, the edge of the flame became of a yellow-green colour.

The reagents employed should be examined, to ascertain if they are free from boracic acid, which may be easily accomplished by the method above described. The turmeric paper will become of a pure yellow colour when boracic acid is absent.

Since the previous research, my former assistant, R. Wilderstein, has found by this method boracic acid in the Emperor's Spring at Aix-la-Chapelle, which Liebig has recently analyzed and pronounced to be free from that acid. From the great resemblance which the water of this hot spring has in its chemical constitution to other waters, it may be inferred that they all contain boracic acid.

SIMPLE TEST TO ASCERTAIN THE STRENGTH OF CHLORINE WATER.

The Bavarian Government has issued a decree that, at the annual visitation of apothecaries' shops, chlorine water must be of the strength determined by the following method: — One ounce of the chlorine water must so completely peroxidize sixteen grains of crystallized proto-sulphate of iron, that red prussiate of potash will not produce a blue precipitate in the resulting solution.

Electricity.—Professor Faraday has instituted a series of experiments, with a view to determine the quantity of electricity connected with the atoms or particles of matter. He says it is wonderful to observe how small a quantity of a compound body is capable of being decomposed by a certain quantity of electricity. "One grain of water will require for decomposition an electric current equal to a very powerful flash of lightning." The chemical action of a grain of water upon four grains of zinc, can evolve electricity equal in quantity to that of a powerful thunderstorm, and he states, that from his experiments it would appear, that 800,000 such charges of the Leyden battery would be necessary to supply electricity sufficient to decompose a single grain of water. The Leyden battery of which he speaks consists of fifteen jars, containing 3510 square inches, or about 24½ square feet of coated glass, charged by thirty turns of a plate electrical machine, the plate being fifty inches in diameter, and of immense power, giving ten or twelve sparks an inch long for each revolution. The author of a paper on this subject in the Philosophical Magazine, remarks, that "the estimate that 800,000 discharges of the battery of fifteen jars, equal to a powerful flash of lightning, would be necessary to resolve a single grain of water into its elements, is certainly astounding, when it is recollected that, according to Professor Faraday, the quantity of electricity that decomposes a body, is the equivalent quantity of electricity that had previously held the elements of that body in combination; for he, with Davy and others, conceives that electricity and chemical affinity are identical powers. Hence in one grain, that is, one drop of water, there must be naturally existing, and constituting the affinity between its oxygen and hydrogen, no less a quantity of electricity, than 800,000 charges of a battery containing 3510 square inches of coated glass, or the equivalent of a very powerful flash of lightning If this quantity of electricity were converted into one spark, it would be 4166 miles in length, taking Professor Faraday's mean estimate of one charge of his battery as the basis of calculation."

Newly-discovered Salt of Quinine.—Dr. William Herapath, of Bristol, in a paper communicated to the Philosophical Magazine, has drawn attention to the optical properties of a newly-discovered salt of quinine, which crystalline substance possesses the power of polarizing a ray of light like tourmaline, and at certain angles of rotation of depolarizing it, like selenite. By dissolving the disulphates of quinine and cinchonine of commerce in concentrated acetic acid, upon warming the solution, and dropping into it a spirituous solution of iodine carefully by small quantities at a time, and placing the mixture aside for some hours, large brilliant plates of this substance were produced. Iodine, sulphuric acid, and quinine, are the constituent elements of this substance. Dr. Herapath considers it probable that these are arranged as a binary compound; the disulphate of quinine acting as a feebly electro-positive base, to the iodine as an electro-negative. He considers it, therefore, to be an iodide of the disulphate of quinine. The crystals of this salt, when examined by reflected light, have a brilliant emerald-green colour,

with almost a metallic lustre; they appear like portions of the elytra of cantharides, and are also very similar to murexide in appearance. When examined by transmitted light, they scarcely possess any colour, there is only a slightly olive-green tinge; but if two crystals crossing at right angles be examined, the spot where they intersect appears as black as midnight, even if the crystals are not $\frac{1}{300}$ of an inch in thickness. If the light used in this experiment be in the slightest degree polarized, as by reflection from a cloud, or by the blue sky, or from the glass surface of the mirror of the microscope placed at the polarizing angle, 56° 45′, these little prisms immediately assume complementary colours. One appears green and the other pink; and the part at which they cross is a chocolate or deep chesnut-brown, instead of black. In performing optical experiments with this peculiar salt, Dr. Herapath says, that it is not necessary to employ a tourmaline; the whole phenomena may be exhibited with equal brilliancy by using two plates of iodide of the disulphate of quinine; one as a polarizer, the other as an analyser, the selenite and disulphate of quinine being interposed. This fully establishes the fact of this substance possessing optical properties precisely equivalent to those of the tourmaline, or of a Nicol's prism, and will be sufficient to show, that all the phenomena capable of being produced by the one may be exhibited by the other. Dr. Herapath further states, that this newly-discovered substance possesses the power of polarizing a ray of light, with at least five times the intensity that the best tourmaline is capable of, and that it must consequently be the most powerful polarizing substance known. In his paper in the Philosophical Magazine, to which I am indebted for the above information, Dr. Herapath enters at great length into the chemical characters of this iodide of the disulphate of quinine. In his examination of its optical properties, he employed one of Oberhauser's achromatic microscopes, with a half-inch object-glass and No. 2 eye-piece; a low power, under 100 diameters.

Compound Ammonias.—The chemical observations and experiments conducted by Hofmann and Wurtz, have established the fact of the existence of a large group of organic alkaloids, very nearly resembling ammonia in the chemical relations of each of these alkaloids. In these organic alkaloids of Hofmann and Wurtz, the elements of an equivalent of ammonia are united with those of a hydro-carburet, or in other words, the radicals, methyl, ethyl, and amyl, may be considered as taking the place of an atom of hydrogen in ammonia; so that they have been described as sustaining the same relation to their corresponding alcohols that ammonia sustains to water. Hofmann, by the action of ammonia upon hydrobromic and hydriodic ethers, has succeeded in forming corresponding salts of these new alkaloids.

The Simaba Cedron.—This drug, which has scarcely yet found its way into the pharmaceutical establishments of this country, is just now attracting some notice on the part of medical practitioners. It has been employed with some degree of success in cases of gout, occurring in patients with whom the colchicum autumnale does not agree, probably owing to some peculiarity of constitution, or type of the disease; and in such cases its employment may be highly advan-

tageous, although it is not probable that it will ever supersede or displace the colchicum autumnale as a remedy for gout in the majority of instances. A spirituous and an acetous preparation of the seeds of the Simaba Cedron have been made use of for internal administration, and I am told that this drug has also been employed as an external application; but at present it has had but a very limited trial in Great Britain. The seeds, or cotyledons, which I have seen, are of a yellowish or light brown colour, somewhat irregular in shape, and somewhat resembling large beans, but three or four times the size of these. Dr. Hooker, in his Journal of Botany, gives some account of the plant or tree, which, he says, grows in abundance in the regions of Panama and Darien, and in the adjacent parts of America, where the natives vaunt its use as an antidote to the wounds inflicted by the bites of venomous reptiles and other noxious animals. I believe it also grows in the East, in some parts of Asia, where it is used as a remedy for some kinds of fevers.

The Leech.—Hirudo Officinalis.—Recent observations on the comparative anatomy of this little animal have made known to us, that just within its mouth it is furnished with three little jaws, triangularly arranged, on each of which are inserted a row of very minute sharp-pointed teeth, much resembling the teeth of a saw. Each jaw has its appropriate muscular apparatus for its peculiar action, and thus is explained the constant shape of the wound observed after the application of this very useful animal.

Artificial Formation of Minerals.—M. Becquerel has recently made some valuable observations on the artificial formation of minerals by electro-chemical action. In detailing his experiments, he states that sulphuret of lead was made to act upon a saturated solution of sulphate of copper and of chloride of sodium, diluted with an equal volume of distilled water, with a view of obtaining compounds of lead, analogous to the compounds of the same metal existing in a natural state. There were found, either upon the pieces of sulphuret of lead, or at the bottom, or in the partitions of the vessels—

1. Chloride of sodium, in cubes, cubic octohedrons, and even octohedrons, of great transparency, and very definite in form.

2. Chloride of lead, in needles and cubes, slightly yellowish, and very perfect in form.

3. Sulphate of lead, in cuneiform octohedrons, precisely resembling in form the crystallized sulphate of lead from Anglesey.

4. Chlorosulphate, in needles.

5. Basic chloride, in microscopic crystals.

6. Sulphuret of copper, black in colour, without any appearance of crystallization. In some of the vessels there were formed only chloride and chlorosulphate of lead; in others, chloride and sulphate; which depended, no doubt, upon the proportions of the sulphate of copper and of chloride of sodium, and the density of the solutions. A voltaic couple, formed of a piece of galena surrounded by a platinum wire, placed in a saturated solution of common salt and sulphate of copper, diluted with three volumes of water, gave rise to the formation of a considerable quantity of crystallized chloride of lead, in cubes, without

any other product; they were similarly deposited, though a little larger, upon a fragment of malachite which was placed in the solution. He supposes that similar reactions to these may occasionally take place on a large scale throughout nature, causing the natural formation of some minerals.

Iodine and its Compounds.—It is highly probable that this valuable article of commerce and materia medica will become more extensively employed as a medicinal agent, for it is well known that iodurets and other compounds of iodine are of the greatest service in scrofulous and other affections of the glandular system. I find that the employment of ioduret of potassium is strongly recommended to the inhabitants of those localities in which goitre and cretinism prevail; and for this purpose it may be mixed with common salt, and taken with various domestic articles of food, as common or table salt is used. Indeed, from the accounts given to us by travellers in some parts of South America, where goitre and cretinism are known to prevail, the natives of these regions now overcome these endemic disorders, by the employment of an iodureted salt extracted from the natural saline springs that are common in these localities.

Pemmican.—It may be interesting to some of your readers to know the mode in which pemmican is manufactured, as this is really a very important article of consumption on all long voyages; in fact, it is nothing more nor less than condensed or concentrated human food. The round or buttock of beef, of the best quality, having been cut into thin steaks, from which the fat and membranous parts were pared away, was dried in a malt-kiln, over an oak fire, until its moisture was entirely dissipated and the fibre of the meat became friable. It was then ground in a malt-mill, when it resembled finely-grated meat. Being afterwards mixed with nearly an equal weight of melted beef suet or lard, the preparation of plain or simple pemmican was completed; but to render it more agreeable to the accustomed palate, a proportion of the best Levant currants was added to part of it, and part was sweetened with sugar. Both these kinds of pemmican were much approved of in the sequel by the consumers, but more especially that to which the sugar had been added. After the ingredients were well incorporated by stirring, they were transferred to tin canisters capable of containing about 85 lbs. each; and having been firmly rammed down, and allowed to contract further by cooling, the air was completely expelled and excluded by filling the canister to the brim with melted lard, through a small hole left in the end, which was then covered with a piece of tin and soldered up. The above is the mode described by Sir John Richardson, in his narrative of his Arctic voyage.

Rectified Oil of Coal Tar.—In the last number of the "Annals of Pharmacy and Practical Chemistry" I mentioned the fact of chloroform being employed as an antiseptic. Another substance, rectified oil of coal tar, is recommended as an antiseptic for the preservation of meat and vegetables. If the flesh of animals, birds with their feathers still unremoved, vegetables, seeds, fruits, &c., are placed in air-tight vessels, filled with water, at the bottom of which is a very little oil of coal tar, so that the substances intended to be preserved are covered by the

water, which thus becomes charged with the vapour of the oil, evaporating at the ordinary temperature, they may be perfectly preserved from decay, decomposition, or putrefaction. *Creosote*, it is well known, is another valuable antiseptic or anti-putrescent agent.

The Effects of Pulverization on the Properties of Bodies.—Hitherto, pharmaceutists have considered pulverization as simply a change of form in bodies, the particles of the pulverized body being considered as so many divided portions of the entire mass, without having undergone any change of property, but merely one of change of form. M. Dorvault thinks that there are many substances in which the operation of pulverization effects some actual change in their chemical characters and therapeutical properties. At present he can adduce two or three decided examples, which lead him to form this opinion; these are—common sugar, gum arabic, and arsenic, or arsenious acid. We all know that sugar, when pulverized, becomes less soluble in water, and less sweet to the taste. He asks, Is this to be referred to an altered electrical condition of the sugar, as the phosphoresence developed during the act of pulverization in the dark would lead us to suspect? The next article mentioned, gum arabic, when powdered, has neither the same taste nor the same degree of solubility as when in the entire state; and he states that the effect of pulverization upon white arsenic, or arsenious acid, is so great, as regards its solubility in water, that whilst a given quantity of water may be made to dissolve forty parts in the vitreous state, the same quantity of water can be made to dissolve only fourteen parts after pulverization.

Test for the Presence of Sulphur in minute quantity.—Dana thus describes a very elegant process for detecting the presence of sulphur in the minutest quantity—for instance, as it exists in the human hair and nails. He directs the portion of hair or nail to be dipped into a mixture of starch and carbonate of soda, and then chars it in the reducing flame of a blow-pipe, when the charred residue yields, with a soution of nitro-prusside of soda, evident indications of the presence of sulphur, denoted by the beautiful purple colour produced.

Test for Iodine.—It is doubtful if we shall ever succeed in obtaining a more delicate test for proving the presence of iodine, than the well-known starch test, which, when properly used, will, by the characteristic blue tint produced, indicate the presence of iodine in the minutest conceivable proportion. In connection with this subject, I may mention that M. Lassaigne recommends highly the chloride of palladium as another delicate test for iodine. He affirms that a solution of iodide of potassium, containing not more than two-millionths of its weight of this salt, is rendered distinctly brown by the addition of the chloride of palladium. Small as this proportion of iodide of potassium really is, still this latter test does not exceed, even if it equal in delicacy, the test by starch, which will detect the presence of iodine, in quantity quite as minute as that just now mentioned. C.

PREPARATION OF PROPYLAMIN, AN ORGANIC BASE, FROM ERGOTIN.

BY DR. F. L. WINCKLER.

When ergotin, the watery extract of secale cornutum, is distilled with caustic potash, ammonia and a volatile organic base pass into the receiver. I have arrived at the conclusion that this alkaloid is identical with propylamin (C_6, H_7, N H_2), which is a product from the decomposition of narcotin by potash, and is also a constituent of the pickle of herrings. Its odour is so peculiar that, without going over Wertheim's research, I recognised it as being the same as that produced from the latter source.

Propylamin saturates acids completely, forming salts which are mostly soluble in alcohol; the sulphate is, however, insoluble in that menstruum, consequently it can be precipitated in fine white crystals from its concentrated watery solution by alcohol. The aqueous solutions of the salts of propylamin are precipitated by tannin and by nitrate of silver in white flocks; by bichloride of mercury, in white powder; and by chloride of plantinum, in minute crystals. The salts of this alkaloid smell strongly of fresh ergot, and are easily decomposed by potash.

When a concentrated aqueous solution of its salts is brought in contact with three or four times its volume of tincture of iodine, a considerable dark yellowish-brown precipitate ensues, and the supernatant fluid appears of a dark reddish-brown colour; in a short time the precipitate diminishes and the fluid becomes gradually decolorized, and after twelve hours only a little precipitate remains, of a bright orange colour, and the fluid is entirely colourless. By the addition of the tincture of iodine, the characteristic odour of propylamin immediately disappears and the mixture smells of iodine. When the neutral aqueous solution of sulphate of propylamin is evaporated in a water-bath, the unbearable odour of herrings is evolved; when the solution is sour, then it has the smell of ergot, and all its reactions disappear. When this concentrated solution is distilled with caustic lime, without artificial heat being employed, pure propylamin passes into the receiver, which smells of ammonia, and all the reactions of this alkaloid then reappear. In consequence of these properties of the propylamin it has heretofore been regarded as ammonia; but I consider that it is the odorous principle of urine, of sweat, and blood, and frequently the cause of the odour which nitrogenous substances emit when treated with alkaline solutions.

The propylamin is to be considered as a conjugate of ammonia. From my former researches I am led to the conclusion that this alkaloid exists combined with an acid in ergot of rye, as it is present in the pickle of herrings, but cannot be obtained by the action of potash, as is the case with narcotin. I have detected formic acid in ergot, which is probably combined with the propylamin. It is not very difficult to determine whether the peculiar action of ergot on the animal economy is due to the presence of this alkaloid, because the neutral salts are soluble in water and may be readily administered. I have also reason to believe that propylamin is a constituent of cod liver oil, because it

combines readily with iodine; and moreover, the oil is a useful agent to administer it with.

Finally it occurred to me to examine my urine, which I did, as emitted after a moderate supper consisting of veal cutlets and potato salad, taking afterwards a glass of water. It possessed neither an acid nor alkaline reaction. Three ounces, whilst yet fresh and warm, were mixed with four ounces of burnt lime and submitted to distillation. The distillate reacted alkaline, and had the odour of propylamin; it behaved with tincture of iodine as ammoniacal liquids. After neutralizing the distillate with sulphuric acid, it was tested with tannin and nitrate of silver, which indicated the presence of propylamin.

Buchner, to whom Winckler has submitted specimens of propylamin and its salts, corroborates the above statement as to its properties, and alludes particularly to the powerful and enduring odour of herrings which it communicates to everything.——*Buchner's Repertorium.*

ON THE PRESENCE OF AMYGDALIN.

BY W. WICKE.

Amygdalin, a substance which is so interesting both in its chemical and botanical relations, has been found to be much more extensively distributed in the vegetable kingdom than has been heretofore expected. The author has found it to be a constant ingredient in pomaceous plants. He detected its presence by submitting to distillation with water various parts of plants and examining the distillate, by means of an iron salt, for prussic acid, having previously determined that no other constituent of plants produces this acid when thus treated. By these he ascertained the presence of amygdalin in the flowers, and particularly in the bark, sorbus aucuparia, sorbus hybrida, and sorbus terminalis; in the leaves, fruit, and bark of amelandrier vulgaris; in the flowers and leaves of cotoneaster vulgaris; in the young shoots of cratœgus oxycantha; in all parts of prunus padus, the leaves of which are so rich in bitter almond oil, that some drops of this oil were separated in the distillate. He could not detect amygdalin in the green organs, the root, the bark, leaves, and buds of prunus cerasus, although it is well known that the seeds contain it. He could not find it either in the leaves or the bark of prunus mohaleb and pyrus malus.

ON GUM GUAIACUM.

BY L. E. JONAS.

It is well known that gum guaiacum in powder, or its spirituous solution, becomes coloured by many influences—first green, and then a beautiful blue. This change of colour proceeds slowly in the ordinary air, and quickly by the action of oxidizing agents, and also through the influence of many organic substances, such as the protein compounds, in a manner that has not yet been explained.

Among the inorganic substances which are known to change the colour of this gum, or more properly speaking, resin, may be numbered atmospheric air, which operates through its oxygen, although slowly, a direct stream of oxygen, ozone, nitrous ether, chlorides of iron, gold, copper and quicksilver, and hypochlorite of soda. Upon the reaction of the last salt, a method has been devised for the detection of the adulteration of the resins of jalap and scammony with the resin of guaiacum, which consists in treating an alkaline solution of the suspected resins with a solution of hypochlorite of soda, which resins, when they only contain $\frac{1}{320}$ part of guaiacum resin, will change to a green colour. I have now found that one part of guaiacum resin dissolved in 14,000 parts of alcohol, can be with precision detected, and that under certain conditions a similar result happens when the dilution is much greater. This result is produced when a strip of very clean filtering paper is moistened with an extremely diluted solution of this resin, and placed whilst moist immediately in the mouth of a glass half filled with a solution of chlorine, or with some free iodine placed at its bottom. Should, however, the paper come in direct contact with either of these bodies, the change of colour to a green and blue will not then be observed.

The method of detecting guaiacum resin as an adulteration is a very simple proceeding. It is only necessary to make a solution of the suspected resin in alcohol, and test it in the manner above described.

The interesting change of colour of guaiacum has not been further investigated than to know that by chlorine water, the resin and its alcoholic solution are first rendered blue, then green, and finally, yellowish brown. From my observations, I conclude that the change of colour is due to three oxygenated bodies, which stand in close relation to three resins, which analysis points out as being contained in guaiacum. The three resins have been studied particularly in their distillation products by Sobrero, who obtained from them an oil (guiacyl) $C_{10}\,H_8\,O_2$, and an empyreumatic acid $C_{12}\,H_8\,O_4$. The properties of the alkaline salts of this acid are, that in the air they become red, and pass through a series of shades into green. The guaiacum wood, from which this coloured resin is obtained, contains no colouring matter, gives no coloured precipitate when treated with alum or chloride of tin, except by boiling under the influence of the air, when it becomes an orange yellow. The first modification, which appears to be the blue resin, minus water, is to be obtained by precipitation with acetic acid from an alcoholic solution of the resin. It resembles the alpha resin of guaiacum, and becomes blue when treated with chlorides. The second is like the first, soluble in alcohol, and gives with metallic chlorides a permanent compound, which is a resinate of the base. The third, whose solution is a deep orange yellow, and whilst it is only totally soluble in ether or a mixture of ether and alcohol, has the same characteristics as the second, through its oxidizing influence on the alpha resin, and forms a green resinate with the bases of chlorides.——*Archives der Pharmacie.*

PHARMACEUTICAL FINANCE.

Facts and figures are stubborn things; the former difficult to belie, the latter to controvert; nevertheless, asserted facts may be fictions, and ingeniously combined figures may be fallacies. An eminent and learned judicial authority has stated that figures were originally used to represent the true state of affairs, but in the present day by the aid of those clever proficients, accountants, they are made, by some mysterious and magical combination, to represent extraordinary profits out of nothing. This is peculiarly an age of facts and figures, as evidenced by every-day life, and the numberless glowing statements of projects teeming with promise for the enrichment, advancement, and happiness of mankind; but to what extent fiction and fallacy enter into their composition it is not our duty or intention here to inquire. It will be sufficient for us at this season, when the annual accounts of the Pharmaceutical Society are about to be laid before its members, to take a passing glance at a few facts and figures usually contained therein.

We are free to admit, that on looking down the balance-sheet last year, it presented to our minds an impenetrable mystery, and an awe-inspiring collection of facts and figures, as unintelligible as the hieroglyphics on an Egyptian pyramid, and as cabalistic as the signs of the Zodiac,—a collection that our modesty prompted us to deal gently with, from the feeling that our ignorance of their meaning arose from an obtuseness of understanding and a want of perception peculiarly our own; but when we find, as we have done, numbers of others, equally interested, participating in our ignorance, we feel no hesitation (numbers begetting assurance) in stating our primitive simplicity. Before we proceed to elucidate a few items, it will be in place here to remark,—and upon the remark there can be no difference of opinion—that accounts in which numerous persons are concerned should be kept in that full, correct, and lucid manner, that their very clearness would stamp truth upon them. Where there is mystery, there will be doubt; where doubt, suspicion; where suspicion, distrust; hence arise evils that grow and threaten destruction to the best intentioned efforts, and render abortive the most disinterested aims.

Taking the debtor side of the accounts published last year, much could be said upon the present method of obtaining and amount of subscriptions; but as money must be had, we shall leave that until the position of the Society will permit the discussion of that question with greater advantage to its welfare. The first item that strikes our attention, on looking down the creditor side, is salaries £.305. It is intended to represent by this item, the salaries of the secretary and librarian; viz., £.200 for the first, £.105 for the second; but when we

inform our readers that the secretary's salary was nearly, and is now fixed at £.350 per annum, the exclamation will naturally arise, How can this be? This fact we will explain by figures. Firstly, £.200, ostensibly as the remuneration for his duty; secondly, £.50 for rent of apartments, which is ingeniously tacked upon the item, rent, rates, &c., the reason for which we shall presently show; thirdly, a profit of nearly one hundred pounds out of the item, delivering journals, which the bye-laws say he shall superintend the transmission of. We wish it to be understood, that the actual salary received by the secretary we do not consider too much for the efficient performance of his duties. The next item, wages, represents remuneration given to the sub-librarian, treasurer's clerk, and domestic servants. Of course, the sub-librarian's stipend of £.75 per annum, *is wages* earned, for he does the work of his office. This explanation is at least suggestive of economy in that department. The next item that we shall notice is, lectures £.530 8*s*. When we point out only a return of £.52 10*s*. as a set-off, any reasonable person would at once say, discontinue so unprofitable a proceeding; but no, is the answer given at present to such a proposition, and thereby hangs a tale. The lectures are vitally necessary, it is said, to the welfare of the School of Pharmacy, the pupils of which have free admission to them; the loss, therefore, ought to be set down to that feature of the institution, and not treated as a separate and independent item. We find the report, following the accounts, stating the average loss upon the school to be £.100 per annum, and upon lectures £.400, without adding a large sum for the rent of laboratory, and a larger one for the interest of capital invested in plant. We must also add to the above sum, the sub-librarian's salary—wages we should say, to speak from the balance-sheet,—which is rendered necessary from the librarian being occupied as director of the laboratory and other appointments, therefore requiring a "sub" to do his duty; and also the £.50 per annum for secretary's apartments, is rendered necessary, from the rooms in the house being required for the laboratory, the sub-librarian's and laboratory assistant's residence, to one of which assistants the Society pays £.50 per annum; but where this sum appears in the balance-sheet, we have not been able to learn from it.

That others have protested against this system of things, cannot be surprising; and that such protests should never have reached the members' ears, is not to be wondered at, when the present arrangement for publishing the transactions is considered. We would ask, what became of the protest appended to the balance-sheet of 1850?—and why are the accounts signed only by two auditors, when three were required by the bye-laws?—and why were the bye-laws immediately altered to meet this case of refractory auditors, or rather of

auditors inclined to do their duty?—and why was a protest of the auditors last year never published? The auditors of that year will perhaps explain this. A case for inquiry is established, and without doubt reform is needed, both for the credit and interest of the Society.

The methods are various by which public institutions seek to avert the undesirable ingress of reform; sometimes they take their stand boldly on their virtues, affecting astonishment greater than belief, that any one should question the integrity and purity of their motives, or the propriety of their proceedings. Some will yield at once; some stand out dogged and determined, till the last film of concealment has been torn from their misdeeds; and some avert inquiry and examination by appearing to desire it.

In conclusion, we will add, if the accounts published were sufficiently in detail to be understood, the present method of giving them to the members, would become objectionable from the circumstance of their going into other hands than those interested. Individuals might with equal propriety, publish their house-keeping accounts in the newspapers, or paste their washing-bills on their front doors. We would recommend to those charged with the production of the balance-sheet, to publish a key or companion, to be sent privately to the members of the Society.

"THE MEDICAL TIMES" AND THE PHARMACY BILL.

The "Thunderer" of the medical press has been indulging in some eloquent denunciations against the Pharmacy Bill, and the class to which it especially refers. It speaks in thrilling language about the birth-right of the apothecaries being now trembling in the balance, as though some flight of locusts were approaching to create a famine of patients in the land. We might ask, what dreadful crime is premeditated by the Pharmacy Bill, to induce the "Medical Times" to attempt to paralyze the efforts of the pharmaceutists to obtain this Bill by putting its strychnine into their small beer? We tell the "Medical Times" that it has struck a chord which will not vibrate—that it has delivered a funeral oration over the empty coffins of the apothecaries, without a bereft audience to echo a response; because the apothecaries have the sagacity to perceive that the more highly a body of men are educated in one branch of a profession, the less likely they are to meddle with its other departments. This axiom is proved by the history of the apothecaries themselves, for in former times their pharmaceutical and medical knowledge were on a par. They only then possessed a moderate acquaintance with each. At the present period, they are a class of thoroughly educated medical practitioners, and have

consequently resigned, all but in name, the practice and cultivation of pharmacy, except occasionally as an unavoidable necessity, into the hands of the chemist.

We are convinced that the Pharmacy Bill will, if passed, do more to wean pharmaceutists from invading the province of the duly qualified medical prescriber, than the most stringent penal enactment that the "Medical Times" could desire or devise. Time alone will tell whether we or our contemporary are the true prophets.

We are surprised that a journal representing a liberal and enlightened profession, should attempt to arouse, by an appeal to the meanest motives of its members, an antagonistic movement against this Bill, and should not argue this question on the broad basis with reference to its bearing on the public good. No doubt the "Medical Times" has sufficient reason for not adopting this latter course, for it must know, unless it has less penetration than we give it credit for, that here lie the strength and the righteousness of the cause we advocate. However, it matters little that the "Medical Times" should be against us, when the *élite* of the medical profession are for us. The testimony in favour of the Bill, as recorded both in petitions to Parliament, and in evidence given before a Select Committee of the House of Commons by such illustrious men as Sir Benjamin Brodie and Dr. Paris, is a tower of strength, and must convince, if not satisfy, the greatest cavillers that the tendency of this Bill is not to create a new order of medical practitioners under the guise of promoting pharmaceutical education, but rather to give that class of the community into whose hands the scientific pursuit of pharmacy has fallen, in consequence of its voluntary surrender by the apothecaries, a legal status and a legal power to demand that *all* who enter its ranks shall be duly qualified.

Every member of the pharmaceutical body is under a deep obligation to those members of the medical profession, who, at a sacrifice of much valuable time, and in spite of some odium, have testified before the highest tribunal of the realm to the necessity and advantage of the scientific pursuit and practice of pharmacy being conducted by the pharmaceutical community under legislative protection and control. We do not offer these remarks in the hope that anything we can say, or have said, will have the slightest influence with these independent and capable witnesses; because we are perfectly aware that they were actuated in giving their testimony in our favour solely by a desire to promote the general good, and because they must be as indifferent to our praise as they are regardless of the censures of the "Medical Times."

It seems strange that the "Medical Times" should so industriously remind the general practitioners that they are apothecaries, a name which, by common consent, they have for a long time eschewed, and

with the name also the proper functions of the apothecary, namely, the practice of pharmacy as an independent art. We need scarcely observe, that the terms "apothecary" and "pharmaceutist" are really synonymous, and that the latter arose in contradistinction to the former, because the apothecaries, by reason of their act of 1815, retained a title which, to all intents and purposes, had become a misnomer at the time when pharmaceutists, or chemists and druggists, came into existence as a class.

Although, we know, occasionally our brethren make reprisals on the general practitioner when he descends to act as the apothecary of former times, by invading his province as the pharmaceutist of the present day, yet we are certain that it is the desire and the rule of our brethren as a body to devote their whole energies to the cultivation and practice of their well-defined art, as it is to their interest to become rather highly qualified pharmaceutists than indifferent medical prescribers; for they know full well, from the past experience of the apothecaries, that it is not for mortals to excel and obtain the public confidence in both capacities. The history of pharmacy, as we have concisely sketched it, is an instance where custom and progress has arisen superior to law; consequently, any attempt to render effete legislation on this subject absolute, would be as ridiculous and as futile as a proposal now to hang men for sheep-stealing.

ON THE PRODUCTION OF CYANOGEN FROM THE NITROGEN OF THE AIR.

BY H. RICHEN.

The observation of the existence of cyanide of potassium in tall furnaces, first pointed out that charcoal containing potash, heated to redness in a stream of atmospheric air, combined with its nitrogen and formed cyanide of potassium. Many researches on this matter have given rise to very contradictory statements, which induced H. Richen to undertake a fresh investigation, with the following result. Carbonate of potash well mixed with charcoal, and exposed to a sufficient heat to form potassium by the reduction of the potash in a stream of nitrogen gas, is completely converted into cyanide of potassium. In conducting this experiment, every possible care was taken to prevent the formation of cyanogen from any accidental nitrogenous compounds in the charcoal, and from any ammoniacal compounds in the nitrogen gas employed. The mixture of charcoal and potash with nitrogen gas was exposed to a white heat in a wind furnace, partly in a porcelain tube and partly in a closed gun barrel. Cyanide of potassium was invariably produced every time this experiment was repeated.

Reviews.

THE DRUGGIST'S GENERAL RECEIPT BOOK: *Comprising a capacious Veterinary Formulary and Table of Veterinary Materia Medica; numerous Recipes in Patent and Proprietary Medicines; Druggists' Nostrums, &c.; Perfumery and Cosmetics; Beverages, Dietetic Articles, and Condiments; Trade Chemicals; with an Appendix of useful Tables, by* HENRY BEASLEY. Second Edition, corrected and improved. London: John Churchill. 1852.

MR. BEASLEY is evidently a painstaking and industrious compiler. Anything in the shape of a new or useful receipt he seizes with characteristic avidity, the result of which he presents to his readers in successive editions of his works. The "General Receipt Book" is an extensive appendix to his "Pocket Formulary." No pharmaceutist who possesses the latter ought to be without the former, for the two form a complete counter companion. It is really surprising what a large amount of information is compressed into a small space in these handy little works.

The first portion of the "Receipt Book" is a complete veterinary pharmacopœia, which will be found very useful to those who live in districts where cattle medicines are much in demand. The second part gives formulæ for the preparation of celebrated quack medicines. With reference to these Mr. Beasley very properly observes, that he will not vouch for their accuracy. These formulæ are, therefore, as often calculated to mislead as to give a correct notion of the composition of these nostrums, from the utter impossibility of analyzing them correctly into their proximate principles or ingredients.

The third division contains a multitude of receipts for perfumery and cosmetics. A fourth portion describes methods for making pickles, beverages, and various other dietetic articles and condiments. The concluding section of this work gives processes for manufacturing what Mr. Beasley terms trade chemicals, under which title he intends to convey a long list of chemicals not generally employed in the preparation of medicines, as well as other compounds sold and sometimes made by the druggist.

We have given a short summary of the contents of Mr. Beasley's "General Receipt Book," so that our readers may form an opinion of its numerous features, which remind us very much of what one of the originators of the Pharmaceutical Society has frequently said was the Society's character, and his object in giving it that character, namely, that there was, and should be, something to please everybody in it;—there was the benevolent fund for the charitable; a school, for those desirous of promoting education; a diploma, for those who wished to obtain an insignia of their connection with the Society; evening meetings, for the scientifically disposed; a journal for the scribblers; a library for the reader, and a museum for the curious. So it is with the author's book. There is something in it to please everybody; from remedies for ducks in convulsions and receipts for renovating old clothes, to electrotype manipulations and the nature of chemical tests. In fact,

there is such an endless variety of matter that we cannot, without transcribing the whole book, give our readers any just idea of its character. We can only add, in the words of Mr. Beasley, "that every purchaser will be able to find in the multifarious contents of this little work, something that may be deemed an equivalent for so small an outlay."

A Handbook of Organic Chemistry: *Being a new and greatly enlarged edition of the Outlines of Organic Chemistry, for the use of Students, by* William Gregory, M.D., F.R.S.E., Professor of Chemistry in the University of Edinburgh. London: Taylor, Walton, and Maberly. 1852.

If any evidence were needed to prove the rapid progress which organic chemistry has made in a few years, the contents of this Handbook by Dr. Gregory would supply an overwhelming testimony. Such is the extraordinary advancement made in organic chemistry, both with reference to its philosophy and the number of its facts, that the chemist whose knowledge of his subject is derived from sources not more than three or four years old, will find that he has much to unlearn and much more to acquire. In fact, so gigantic a science has chemistry become, in its innumerable details, that it requires more than the lifetime of any one man to master its multitudinous ramifications.

Holding these opinions, we regard Dr. Gregory's Handbook as an especial boon to the student of organic chemistry; for while it avoids giving details as much as possible, it places the student thoroughly in a position to gather a knowledge of the general progress and condition of organic chemistry in all its relations. The author discusses the much vexed questions (heretofore regarded as antagonistic doctrines) of compound radicals and of chemical types, with an impartiality which does honour to a disciple of the Giessen school, and shows clearly that these two theories are not necessarily incompatible with each other, and that both are founded on correct data and mutually assist in explaining many phenomena in chemistry.

Dr. Gregory also developes in this work a doctrine which bids fair to enable us to classify organic compounds on an entirely new basis. This doctrine, which has enlisted as its advocates some of the most eminent Continental chemists, assumes that all compounds may be arranged in series, differing from each other by a certain number of equivalents of carbon and hydrogen, or by a multiple of it; and that the properties of the compounds of each series are analogous, and differ only in proportion to the amount of carbon and hydrogen contained in them. This doctrine is termed that of homologous series of organic compounds, and is founded on well-established facts, although some members of the various series remain to be discovered. To render this doctrine clear, we shall cite from Dr. Gregory's work the most complete series of homologous compounds known, as an example, and remind our readers, in proof of the analogous properties of the compounds of this series, that the boiling-point of each body contained therein rises for every

step in the scale 34° Fahr., except in that portion of the series between numbers 19 and 22, where some few compounds remain to be discovered to render the series quite complete.

"*Volatile and Oily Acids of the General Formula* $(C_2 H_2)_n O_4$.

1.	Formic Acid	$= C_2 H_2 O_4$
2.	Acetic	$= C_4 H_4 O_4$
3.	Propylic	$= C_6 H_6 O_4$
4.	Butyric	$= C_8 H_8 O_4$
5.	Valerianic	$= C_{10} H_{10} O_4$
6.	Caproic	$= C_{12} H_{12} O_4$
7.	Œnanthylic	$= C_{14} H_{14} O_4$
8.	Caprylic	$= C_{16} H_{16} O_4$
9.	Pelargonic	$= C_{18} H_{18} O_4$
10.	Capric	$= C_{20} H_{20} O_4$
11.	Margaritic	$= C_{22} H_{22} O_4$
12.	Laurostearic	$= C_{24} H_{24} O_4$
13.	Cocinic	$= C_{26} H_{26} O_4$
14.	Myristic	$= C_{28} H_{28} O_4$
15.	Benic	$= C_{30} H_{30} O_4$
16.	Ethalic	$= C_{32} H_{32} O_4$
17.	Margaric	$= C_{34} H_{34} O_4$
18.	Bassic	$= C_{36} H_{36} O_4$
19.	Balenic	$= C_{38} H_{38} O_4$
20.	Behenic	$= C_{42} H_{42} O_4$
21.	Cerotic	$= C_{54} H_{54} O_4$
22.	Melissic	$= C_{60} H_{60} O_4$

"Here we may suppose the radical of the first acid to have been changed by the successive additions of 2, 4, 6, 10, or 20, or more eqs. of carbon and hydrogen, the oxygen remaining unchanged. Or we may as readily suppose one of these acids, by losing oxygen, to pass into another. Thus we may either conceive butyric acid to be formed from acetic acid by the addition of $C_4 H_4$; or acetic acid to give rise to butyric acid, by losing half its oxygen; for $2 (C_4 H_4 O_4) = C_8 H_8 O_8 - O_4 = C_8 H_8 O_4$."——Page 10.

There is a most interesting and instructive chapter in this book on the nutrition of plants and animals, which is worthy of being quoted entire, but want of space forbids us to do so; therefore we must content ourselves by mentioning that the author, in a series of tables, makes manifest that plants, in absorbing as food carbonic acid and water, have the power to deoxidize these bodies, by which various acids and other organic compounds are formed and assimilated, and oxygen expelled. He has treated this subject of the nutrition of plants in a method identical to that by which Liebig proved that the nutrition of animals is an oxidizing process, that is, by showing the absolute difference in the composition of substances imbibed as food and those excreted and assimilated.

The author informs us in his preface that the previous editions of his Handbook have been adopted as a text-book in the Universities of Oxford, Cambridge, and Dublin. With reference to this favourable reception of his work, we can only add that if it were not thus adopted, it deserves to be so; for certainly it stands alone, containing, as it does, a more perfect account and a more philosophical arrangement of the vast materials which now constitute organic chemistry, than any other treatise in the English language.

Although Dr. Gregory unpretendingly puts forth his Handbook as

being written for the use of students, yet we opine that the advanced chemist, who desires to possess in a condensed form a comprehensive view of organic chemistry in its varied aspects, will feel that the author has rendered his fellow-labourers an essential service by this well-timed and valuable contribution to the literature of his own science. We regret that there is a dearth of such books in the vernacular tongue, in this age of mental activity and publishing enterprize, because without these aids the chemical investigator is compelled to search through a host of foreign and British journals, to learn the actual status of any subject which he may be desirous of inquiring into.

ON PIPERIDINE. A NEW ALKALOID.

BY M. CAHOURS.

In a paper published in the 70th vol. of the Ann. der Chimie und Pharmacie, M.M. Rochleder and Wertheim, announced that on submitting to distillation a mixture of piperine and caustic soda, a volatile oily base is obtained, possessing all the properties of picoline.

Wishing to make a very deep research into the nature of this base and its isomeric aniline, M. Cahours distilled, according to the directions of the above-mentioned chemists, one part of pure piperine, with from 2½ to 3 parts of caustic potash. The products of this distillation, collected in a cooled receiver, was found to be composed of water, two distinct volatile bases, and a trace of a neutral substance possessing an agreeable aromatic odour, recalling that of the derivatives of the benzoic series.

On treating the crude product with fragments of caustic potash, a light oily matter, soluble in all proportions of water, was separated, and which, submitted to distillation, was almost entirely disengaged between 105° and 101° C. Towards the end of the operation, the thermometer rose rapidly to 210° C. and remained stationary at that point. The most volatile portions, forming more than nine-tenths of the crude material, being submitted to a second rectification, distilled at a temperature of 106° C. It is a colourless liquid, possessing a strong ammoniacal odour, at the same time resembling that of pepper; it restores the blue colour of reddened litmus paper, has a very caustic taste, and saturates the most powerful acids. It dissolves in all proportions of water, to which it communicates very distinct alkaline properties: the solution acts in a manner analagous to that of ammonia with respect to saline solutions; it does not, however, appear to re-dissolve the oxides of copper and zinc.

This base forms perfectly crystallized compounds with hydrochloric, hydrobromic, hydriodic, sulphuric, nitric, and oxalic acids. The hydrochlorate yields with chloride of gold a crystalline powder, formed of small needles of a golden yellow colour; and with the bichloride of platinum, a compound which crystallizes in long needles of an orange colour. Several analyses of this subtance made by M. Cahours, furnish exactly the same results; the numbers correspond to the formula $C^{10}\ H^{11}\ N$, which has been verified as well by the analyses of its salts and some of its derivatives, as by the density of its vapour; the preceding formula representing four volumes. M. Cahours proposes to give this new alkali the name of piperidine.

COLOURED FIRES FOR PYROTECHNICAL PURPOSES.

ERDMANN, in the last number of his journal, gives the following formulæ for preparing coloured fires, which he has proved and found to answer the purpose intended admirably. He particularly enjoins the caution that the ingredients, after being powdered in a mortar *separately*, should be mixed with the hand, as dangerous explosions would inevitably follow from the ingredients being rubbed together with any hard substance.

Red.

Chlorate of potash,	61 parts.
Sulphur,	16 „
Carbonate of strontia	23 „

Purple Red.

Chlorate of potash,	61 parts.
Sulphur,	16 „
Chalk,	23 „

Rose Red.

Chlorate of potash,	61 parts.
Sulphur,	16 „
Chloride of calcium,	23 „

Orange Red.

Chlorate of potash,	52 parts.
Sulphur,	14 „
Chalk,	34 „

Yellow, No. 1.

Chlorate of potash,	61 parts.
Sulphur,	16 „
Dried soda,	23 „

Yellow, No. 2.

Saltpetre,	50 parts.
Sulphur,	16 „
Dried soda,	20 „
Gunpowder,	14 „

Yellow, No. 3.

Saltpetre,	61 parts.
Sulphur,	17½ „
Dried soda,	20 „
Charcoal,	1½ „

Light Blue.

Chlorate of potash,	61 parts.
Sulphur,	16 „
Burnt alum,	23 „

Dark Blue.

Chlorate of potash,	60 parts.
Sulphur,	16 „
Carbonate of copper	12 „
Burnt alum,	12 „

Dark Violet.

Chlorate of potash,	60 parts.
Sulphur,	16 „
Carbonate of potash,	12 „
Burnt Alum,	12 „

Sulphate of potash and ammonio-sulphate of copper may be added to render the colour more intense.

Light Violet.

Chlorate of potash,	54 parts.
Sulphur	14 „
Carbonate of potash,	16 „
Burnt alum,	16 „

Green.

Chlorate of potash,	73 parts.
Sulphur,	17 „
Boracic acid,	10 „

Light Green.

Chlorate of potash,	60 parts.
Sulphur,	16 „
Carbonate of barytes,	24 „

For Theatrical Purposes.

White, No. 1.

Saltpetre,	64 parts.
Sulphur,	21 „
Gunpowder,	15 „

White, No. 2.

Saltpetre,	64 parts.
Sulphur,	22 „
Charcoal,	2 „

Red.		Green.	
Nitrate of strontia,	56 parts.	Nitrate of barytes,	60 parts.
Sulphur,	24 ,,	Sulphur,	22 ,,
Chlorate of potash,	20 ,,	Chlorate of potash,	18 ,,

Rose.		Blue.	
Sulphur,	20 parts.	Saltpetre,	27 parts.
Saltpetre,	32 ,,	Chlorate of potash,	28 ,,
Chlorate of potash,	27 ,,	Sulphur,	15 ,,
Chalk,	20 ,,	Sulphate of potash	15 ,,
Charcoal,	1 ,,	Ammonio-sulphate of copper,	15 ,,

THE ACTION OF SULPHUROUS ACID ON ORGANIC COLOURING MATTERS.

BY C. F. SCHÖNBEIN.

Some time since Schönbein pointed out that oxygen, under the chemical influence of sunlight, or many organic bodies, such as ether, oil of turpentine, and sulphurous acid, possesses the property of decomposing indigo dissolved in sulphuric acid. The change which the indigo solution undergoes hereby is the same as that which is produced by oxygen, nascent oxygen, binoxide of hydrogen, and oxygenated oil of turpentine. If, therefore, linen dyed with indigo is bleached quickly in the sun, and slowly in the shade, by a mixture of sulphurous acid and atmospheric air, there can be no doubt that the phenomenon of the bleaching of the red rose is not to be explained in the same manner. Schönbein has shown that the colouring principles of most blue and red flowers and fruits, form colourless compounds with sulphurous acid; that the pigment of yellow flowers is indifferent to the action of this acid and not bleached by it, and that indigo blue, cactus red, and the yellow of silk are bleached by sulphurous acid, which, under the influence of light, determines by oxidation the destruction of these colouring matters. The means by which sulphurous acid effects the bleaching of organic material are of two kinds; in most cases it acts as a mere covering for the colouring matter, and in some few it destroys it by oxidation

If a moistened cord of deep yellow raw silk be placed in a clean bottle containing the above-mentioned mixture of gases, and left in the dark, it bleaches very slowly, and it is only after many months that it becomes quite white. The fibres of silk, on the contrary, which come in direct contact with the sun's rays, are in a few hours partially, and in a few days completely bleached, whilst the inner fibres retain their original yellow colour. Fresh flowers of different kinds of cactus become, in these gases, under the influence of the sun in June, in the space of four or five hours completely bleached, and even so in the dark, although somewhat less quickly. The dissipated colour of these flowers cannot by any agency be again restored.

When the red colouring matter of the cactus speciosissimus is extracted by means of water, containing either acetic or muriatic acid, and the resulting blue-red fluid mixed with sulphurous acid, no change of colour is produced; but if it is shaken with atmospheric air, in the sun, the colour is gradually and in the end completely dissipated. The decolorization also proceeds, but more slowly, in the shade.

Schönbein has tried the action of gaseous sulphurous acid on a great number of blue and red flowers and fruits. In all cases it more or less quickly decolorized them. Amongst these were the campanula, sage, rose, clove, dahlia, and violet, the bleaching of which takes place in a method different to that of the cactus flowers, which flowers, with indigo solution, coloured linen, and yellow silk, require oxygen, whereas to bleach the previous ones it is not necessary; and moreover, they are bleached as rapidly in the dark as in the light.

For the explanation of these changes Schönbein adopts the theory of Berzelius, namely, that the blue and red colouring principles of flowers form, with sulphurous acid, colourless compounds, and with sulphuric acid coloured ones.——*Journal für Praktische Chemie.*

PREVENTION OF RANCIDITY IN BUTTER.

Chalambel recommends the following process for the manufacture of butter, by which its quality is improved and its disposition to become rancid prevented.

When butter contains only the fatty portions of milk, it changes very slowly under the influence of the atmosphere. It contains, however, generally a quantity of casein, derived from the cream, which retains this nitrogenous substance. This casein acts as a ferment on the fatty acids of the butter, and produces those changes which give the character of rancidity to it. By washing butter, this cause of its rancidity cannot be completely removed, because water will not dissolve casein when, by the acids of the cream, it has been converted into an insoluble modification. It could be entirely removed if these acids were neutralized, as the casein could then be washed from the butter. To accomplish these objects Chalambel proceeds in the following way:—The cream, in small portions, is with constant agitation to be carefully neutralized with milk of lime, and agitation proceeded with in the churn until the butter separates from it, but not so as to form a mass, as is usually the practice. The buttermilk is then poured off, fresh water added to the butter, and churning continued until the butter combines into a mass; the butter is then finished in the ordinary method. By this process, he states, butter is best obtained, and keeps good much longer than that made in the usual way. The buttermilk thus produced loses its disagreeable smell and its laxative properties on men and animals; and besides, in this state they will more readily partake of it than in the common form. Chalambel has further found that when butter has become too rancid to be consumed as food, it may be again restored by washing it with lime water. For this purpose lime water can be replaced by any other alkaline fluid.

NEW METHOD FOR PREPARING AND EXHIBITING PROTIODIDE OF IRON.

BY M. H. BONNEWYN.

Several methods have been proposed for the preparation and exhibition of protiodide of iron, all of which are, as far as I am acquainted with them, subject to many inconveniences and objections. It is on this account that I offer to my fellow-labourers a new method, which, both on account of its uniformity of action and facility of administration, deserves to be adopted universally.

Every practical man knows that all preparations of protiodide of iron are bad, for instance, the syrupus ferri iodidi is a medicine which is generally disliked, and in some individuals causes even nausea and vomiting. The pilulæ ferri iodidi likewise disagree with some constitutions, and when they seem to agree, they never produce the same regular effects even if prepared at the same laboratory. According to trials made by an experienced physician, who has administered the protiodide, prepared according to my method, I am assured that this remedy prepared by a double decomposition in the stomachs of the patients, has always agreed with them, and produced more constant and salutary effects. It is already a well-known fact, that the iodide of iron in its incipient state is better assimilated by the organs.

No 1. Dissolve one gramme of iodide of potassium in 300 grammes of water. No. 2. Take of sulphate of iron 1½ grammes; make a powder and divide it into eighteen equal parts. Dissolve one of the powders in a large table-spoonful of sugared water before swallowing it; take immediately afterwards, one table-spoonful of the solution.

It is evident that by this operation, each time there is produced in the stomach one grain, or about five centigrammes of iodide of iron in its incipient state.

Although these proportions do not correspond absolutely, but only approximately with their chemical equivalents, nevertheless their effects answer fully the purposes both of the chemist and physician.

ON TINCTURE OF OPIUM.

The Pharmaceutical Society of Antwerp has employed a commission composed of its members to determine the best menstruum for the preparation of tincture of opium. It has arrived at the following results:—

1. Good opium gives, when treated with water, less extract than bad or adulterated.

2. By warm digestion, a stronger solution is obtained than by cold infusion.

3. Alcohol must be preferred to wine in the preparation of tincture of opium.

4. Narcotine, although alone insoluble in water, becomes partially extracted with the other ingredients of opium. When it is advisable to avoid the removal of narcotine, proceed as follows:—Treat carefully-prepared aqueous extract of opium with boiling alcohol; this dissolves out the narcotine and morphine, from which solution, when cold, the

narcotine separates. After the precipitation, whatever ingredients are necessary to form the tincture are to be added to the alcoholic solution.

By this opportunity, the commission recommend another process by which morphine may be more readily separated from narcotine. One part of opium is to be treated with four parts of alcohol. After the alcohol has been separated by filtration, the residue is again to be macerated with three parts of alcohol. The resulting tinctures, after being mixed, are to be set aside for twenty-four hours to allow the narcotine to separate; afterwards the morphine is to be precipitated with ammonia. To remove the last traces of morphine, the fluid, from which the precipitated morphine has been filtered, is to be kept in a warm place for two days, a little water having been previously added, when a fresh quantity of morphine will fall down. By this method, $\frac{1}{12}$ of the weight of the opium employed, can be obtained as morphine.

ON AMMONIO-CHLORIDE OF MAGNESIUM.

BY W. S. CLERK.

Chloride of magnesium is not volatile by itself; but forms a compound with ammonia, which may be volatilized. This compound is formed when chloride of magnesium is heated to the melting point of silver in a stream of ammoniacal gas. It sublimes as it is formed in a white amorphous powder. It appears that it is only volatile without decomposition in an atmosphere of ammonia. By the moisture of the air, it becomes completely decomposed. Its composition is $Mg\ Cl + 2\ N\ H_3$. Magnesium is evidently a volatile metal. When heated in the air, it burns with a white flame, as zinc, with the formation of a white vapour of magnesia.

FERRATE OF POTASH AS AN ANTIDOTE FOR ARSENIC.

Chattel has found that one drachm of ferrate of potash precipitates in an insoluble form forty grains of arsenic, and that the hydrated peroxide of iron is much less effectual, as one ounce of it only precipitates five grains of arsenic; consequently he recommends the above salt as an antidote for arsenic. Whether the strong alkaline reaction of ferrate of potash will prevent its being used as an antidote remains to be determined, and also whether it be really an antidote, which can only be decided by its action on the animal economy in those cases where arsenic has been previously administered.

COMBINATIONS OF ARSENIC WITH ALBUMEN.

Mansion House, Old Park, Bristol, April 11th, 1852.

To the Editors of the Annals of Pharmacy and Practical Chemistry.

Gentlemen,

I am sorry to learn that Dr. Muspratt's engagements will prevent him from repeating his experiments relative to what he terms "the vexed albumen and arsenious acid controversy;" because I am confident that were he to do so, he would arrive at results similar to my own. That gentleman's explanation, as regards certain exceptionable passages in his former letter, is perfectly satisfactory; and I must express my regret that the ambiguous character of the

insinuations referred to should have led me to suppose that they were applied to myself. Concerning Mr. Edwards' qualifications as a chemist, of course I am not prepared to speak. Not being personally acquainted with that gentleman, I can only judge of his talents, as I do of Dr. Muspratt's, from common repute and his published productions. In the present instance, however, I believe that he is in the right. My reasons for adopting this opinion have been fully set forth in my former letter, and I hope soon to be enabled to offer some more arguments in support of my views. My time, however, at the present moment, like my opponent's, is unfortunately much occupied by other and more important professional duties; but I expect that, in the course of a few weeks, I shall be sufficiently leisurable to resume the consideration of the subject in dispute, and will then, with your permission, communicate my results to your readers.

In the mean time, I should wish to direct your attention to an observation that is made by Dr. Muspratt in your last number. Alluding to the action of the so-called arsenite of albumen on the animal economy, he remarks, "I have repeatedly stated that it (*i.e.*, the arsenite of albumen) is not poisonous, to which statement I still adhere; and if Mr. Herapath will properly prepare *the compound*, he will also find it innocuous. . . . . White of egg contains free alkali, which combines with the arsenious acid; consequently, if Mr. Herapath get a poisonous compound it is arsenite of potassa, and not the arsenite of albumen." The presence of free alkali in the albuminous portion of the egg is an established fact, and cannot therefore be disputed; but it still remains to be proved that any arsenite of potash or soda is formed when arsenious acid is boiled with white of egg. If such be the case, how is it possible to account for the absence of all traces of arsenic in the filtrate in the following experiment, which is thus described by Dr. Muspratt? (See Quarterly Journal of the Chemical Society of London, No. XIV., p. 179.) "I took 0·107 grms. of dissolved arsenious acid," he says, "and 12·67 grms. of the glairy albumen of eggs. They were intimately triturated together for about twenty minutes, coagulated by heat, and evaporated to dryness in a water-bath. The white residue, affused with distilled water and filtered, yielded a filtrate which gave *no deposit* of arsenic on copper by Reinsch's test, nor any stains on porcelain by Marsh's apparatus."

Professor Muspratt's own results, therefore, contradict his assertion. I am not, however, as yet prepared to decide whether the latter is incorrect; indeed, as you will easily perceive, most of the results I have hitherto obtained would lead me to the opposite conclusion.

The compound I administered to the cat, mentioned in my last letter, though prepared according to the above directions, and with a *smaller* proportion of arsenious acid, proved *poisonous*; if any mistake was committed, therefore, Dr. Muspratt, and not I, was the cause. However, it is my intention to repeat my experiments on this point, with such precautions as will preclude all possibility of error resulting from the presence of an alkaline arsenite; and I will then make you acquainted with the results.

The most convincing argument, I may observe, that can be urged against the existence of a definite compound of arsenious acid and albumen is the non-formation of any precipitate upon mixing cold aqueous solutions of these two substances. For it is well known that tannic acid—a much weaker acid than the arsenious acid—immediately produces a dense precipitate of tannate of albumen when added to albuminous solutions. The mistake that has been made by your correspondent in identifying me with Professor Herapath, the well-known toxicologist, has been doubtless already perceived by you, as I find I have several times pointed out the distinction in my communication to you, and also in my original paper in the Philosophical Magazine.

I remain, Gentlemen, yours respectfully,

THORNTON J. HERAPATH.

BOOKS RECEIVED.

"The New York Journal of Pharmacy," for January, February, and March 1852. We accept the proposition to exchange Journals, and will transmit the "Annals" in due course.

"Gregory's Handbook of Organic Chemistry." Third edition. 1852. Taylor, Walton, and Maberly. London.

TO CORRESPONDENTS.

Justitia Omnibus will perceive that it is necessary the line should be drawn somewhere; and we ask, can it be drawn in any direction so well as where it makes that class the exception which has youth and opportunity in its favour. However, our correspondent needs not fear, for we have sufficient reason to believe that our councils will not prevail in the settlement of this matter, in consequence of a time-serving policy which avoids even the hostility of apprentices. If *Justitia Omnibus* understand his profession as well as he can defend his position on paper, he has nothing to dread should the result be adverse to his opinions.

E. H., Kensington.—Dissolve pure silver in pure nitric acid, and evaporate the solution to dryness. Re-dissolve the saline residuum in an equal weight of distilled water, then evaporate slowly in a sand-bath until about one-half of the water has been dissipated, and set aside the solution in a cool place that crystals may form, which must be separated from the mother liquor and dried. The mother liquor may be treated as above, to separate more crystals from it.

A Subscriber, Wigton.—Cod-liver oil.

G. H. S., Stafford, is no doubt correct in his opinions.

William H.—Alum is the only salt of three named which remains unchanged. A saturated solution of it should be employed, into which the body to be coated should be immersed until the crystals are deposited.

D. W. Y.—1. Bicarbonate of soda dissolves unchanged in cold distilled water. The subsequent milkiness alluded to arose from lime contained in the water. 2. Oil of peppermint is not perfectly soluble in all proportions of rectified spirit, but is soin absolute alcohol.

A Member, Wolverhampton.—1. Benzol may be obtained at a very reasonable price through a wholesale dealer in London. 2. The process of the Pharmacopœia gives a good result when carefully conducted. 3. Expose the oil to sunlight for some time.

T. Barry.—There is no correct rule. An approximate method may be learnt by a comparison of two tables, which indicate the amount of absolute alcohol present for each degree.

W.Y.G.—1. Add a little oil of turpentine to the balsam of sulphur. 2. Precipitated chalk is made by adding a solution of carbonate of soda to a solution of chloride of calcium. The term "gold litharge" is applied to that description of litharge which has a red colour, the paler variety being termed "silver litharge."

A Sufferer, Barnstaple.—We cannot express an opinion upon an *ex parte* statement. If you are unjustly dealt with, you have a legal remedy.

Z.A.—Examination by the microscope after the method described, Page 27, No. 1, of this journal.

Mr. Thomas Lloyd, Albion Place, Woolwich.—Marking ink, requiring no preparation, is readily prepared as follows. Dissolve 180 grains of nitrate of silver in half an ounce of distilled water. Add to the resulting solution strong liquor ammonia, in sufficient quantity to re-dissolve the precipitate which is formed upon its first addition. Triturate 10 grains of lamp-black, with half an ounce of powdered gum arabic, and convert the mixed powder into a mucilage by the gradual addition of distilled water. Mix the mucilage with the above silver solution, and add, if necessary, sufficient distilled water to make the whole measure two ounces.

Mr. J. B. Ponton.—"Balfour's Manual of Botany." It contains a copious index, which renders it equivalent to a Dictionary of Botany.

Studens.—To make blacking, take one pound of ivory black, and add sufficient water to make it into a paste, then stir in sufficient oil of vitriol to render it slightly acid; then mix with it two ounces of linseed oil, and one pound of brown sugar. Afterwards add gradually, with constant stirring, half a gallon of water.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG,

Professor of Chemistry at the University of Giessen.

No. V.

Of Chemical Operations, and of the necessary Apparatus.

The objects of chemical operations are mixtures and separations; they are much more difficult and complicated than mechanical operations, and require not only manual skill, but a thorough knowledge of chemistry. We give here only a general outline of them, as we suppose the reader acquainted with the principles of natural philosophy and chemistry. Chemical combinations are divided into solution, mixtures of the first degree, and chemical definite combinations, mixtures of the second degree, or real chemical mixtures. The operations are arranged in a similar way. We begin with those which effect slight solutions, proceed afterwards to those which effect slight combinations, and finally describe those operations which effect more complete solutions and chemical compounds. This division, however, is not altogether correct, as in many cases there is a natural transition of one operation into the other.

Heat must be regarded as one of the first agencies in chemical operations, because we know, from the principles of chemical affinity, that on heat principally all chemical activity depends. Hence we begin with the means employed for producing and regulating heat. The fuel employed chiefly is coal and charcoal, very seldom anthracite or peat. Furnaces are the apparatus employed for producing and regulating heat. There are different kinds of furnaces employed in the laboratory.

The furnaces employed in pharmacy have generally four compartments:—the ash-pit, at the basement, into which the ashes fall, and through which fresh air is admitted to the burning fuel; it has usually a small iron door;—the body or fireplace, for holding the fuel, which contains a grate that separates it from the ash-pit; the chimney, by which the heated air and smoke escape; and a superstructure above the fireplace to hold the vessels employed in the operation.

The different furnaces are, the wind furnace, the reverberating furnace, the Cupel furnace, and the blast furnace.

The wind furnace is either portable or fixed. The portable one consists usually in a cylinder made of a sheet of iron, one and a half or two feet high and one foot in diameter, closed at the bottom and open at the top, resting on feet. Above the ash-pit, which has a small opening closed with a door, is placed the grate, above which is built the fireplace, which is made either of a coating of bricks, 1½ inches thick, or by inserting a hollow cylinder of burnt clay. The cylinder is sometimes provided with a second door, for introducing the fuel; otherwise it is introduced from above. In this kind of furnaces, the fireplace and the place for introducing the retorts or stills are one and the same.

If an arched Cupel with a long tube is adapted over this furnace, it is transformed into a smelting furnace, which is much the same as a reverberating furnace. Furnaces are also made of burnt clay, with different superstructures, and holes to introduce retorts and the like; they are very useful for small operations. Fixed furnaces are usually made of bricks, and in all respects according to the same rules as the portable ones, with the exception that the interior may be square instead of cylindrical. By building over the fireplace a kind of chimney, 8 feet to 10 feet high, proportionally enlarging towards its summit, allowing a large opening closed with an iron door, for the introduction of the fuel, we obtain a powerful smelting furnace, the power of which may be increased by bellows, which, however, is not necessary for pharmaceutical operations.

Furnaces in which Cupels are fixed deeply with brickwork are in some way different from the former. The ash-pit is built on the light side, 8 inches or 6 inches high, with bricks, and provided with an iron door, well fitted. The grate, from 8 inches to 9 inches long and of equal breadth, is made of thick square 6-inch iron bars, at a distance of one-fifth of an inch apart, placed flat, not on their corners. It is placed not quite in the centre, but 1 or 2 inches nearer the place where the fuel is introduced, according to the size of the vessel which is going to be fixed, and placed so that the bars lie lengthway towards the firing-place. The grate is enclosed by four bricks laid flat, so as to produce a space of 1½ inches high between the grate and the bricks; the opening for introducing the fuel ought also to be provided with an iron door. From this square encasement the fireplace is made immediately to assume a spherical form, which by degrees ends in a cylindrical opening. There remains a vacant space of 1½ inches between the upper enclosure and the kettle, the keystone being from 1½ inches to 2 inches thick. The height of the fireplace, from the grate to the bottom of the kettle, is about 8 inches to 10 inches. Where the draught is carried out, it is advisable to cause a brick from 4 inches to 6 inches broad to project above the bottom of the kettle, to cause the fire to rebound upon the same before escaping by the draught. The opening of the fireplace must be of equal dimensions as the grate, and its height must stand parallel with the bottom of the kettle. The draught is carried off by means of iron tubes, or by bricked chimneys; they must neither be too low nor too narrow; they must be about five or six feet high and five or

six inches in diameter, provided with valves or registers. The draught can be carried through the drying room.

This furnace is used for sand Cupels, stills, &c. of 2 feet in diameter. If larger vessels be employed, the grate must be made larger, but not considerably. This furnace is very powerful and requires but little fuel, and by means of registers the heat can be regulated at pleasure. A circular fire is also useful for bricked-up kettles and water-baths. For this purpose the vessel is so bricked up that a keystone is made to run almost parallel with its bottom, and another brick is made to project 4 inches or 6 inches around the vessel; so that commencing from opposite the opening of the fireplace, a space is formed, 4 inches or 6 inches high and 1½ inches wide, around the vessel, which space ends in the chimney, which causes the fire not only to centre upon the bottom of the vessel, but to move around it before it escapes through the chimney. Care must be taken to cause the draught to play around the lower part of the vessel, or else it acts too violently upon its upper part, and injures the vessel if not always full of water. The usual fault of furnaces is that the grate and fireplace are too large. If the bars lie too far asunder, the waste of fuel is too great. Sometimes the fireplace is too high or too low; in the first case, the fire does not act with full effect, being too far from the vessel; in the second, the heat escapes too quickly by the draught. Moreover, the fire never burns briskly in a narrow space; the flame must have room to develope itself: this is also the case with charcoal. Even the close contact with a strong conductor somewhat hinders quick combustion. Proper draughts are sometimes neglected or improperly arranged. Grates and ash-pits must be kept particularly clean. The fuel must be placed upon the grate only, not on the enclosing brickwork; hence the wood must be properly cut for this purpose, 8 inches in length. The door of the fireplace must be kept always closed, and the heat regulated by registers.

Galley ovens are furnaces which contain sundry Cupels, heated by a common fireplace; the necks of the retorts project from both sides of the furnace. They are not employed in the laboratory but in chemical manufactures. There are other kinds of furnaces, even such in which the fire may be applied in different directions. However, the utility of such complicated apparatus does not always answer our expectations. Simplicity and ingenuity are better than all artifices.

The lamp furnace is used merely for small operations; a lamp constructed upon the principle of Argand, particularly one with a double concentric wick, and a metal stand with rings, is all that is requisite for this purpose. Spirit of wine is the best fuel.

The most useful instrument for producing intense heat with little trouble is the blow-pipe, or blow-lamp. The last is chiefly used in bending glass tubes. To this end, atmospheric air is blown by bellows through a blow-pipe, which is applied to an oil or spirit lamp, and the flame thus driven to the glass which is held on the other side, and by this heat the glass is made to become ductile, and to assume any cast that is required. The use of the blow-pipe is invaluable for experiments on a small scale.

Vessels intended to be exposed to heat, are not always put into imme-

diate contact with the fire, but immerged in something else in order that the heat may penetrate gradually, or be longer retained in the bodies which are contained therein. This is attained by vessels called baths. There are sand-baths, water-baths, and steam-baths.

Cupels are generally used in sand-baths; these are kettles of iron, with a reverted broad brim, having on the upper part, on one side, a semicircular cut. They are built in the furnace above described, and filled with sand. They are used chiefly for distillation by means of retorts.

Since water under usual atmospheric pressure can only be heated to 212° Fahr., and watery fluids contained in closed vessels, are slowly volatilized in a water-bath, and on the other hand, a high temperature destroys organic bodies, it would be useful to find a bath which should be only a few degrees higher in temperature, so as to cause the fluids contained in the closed vessel to boil, without being destroyed. Solutions of some salts will answer this purpose, for instance, of common salt. I found also, by experience, that a solution of muriate of lime, which is often a waste product in chemical operations, answer exceedingly well. The distillation of water is brisk; even acetic acid, obtained from sulphate of potash and acetate of tin, was perfectly distilled without any empyreumatic smell. The solution reached from 212° to 220° Fahr. To maintain uniform heat, it is necessary to replace the evaporated fluid by a small addition of fresh water.

ON THE COMBINATION OF ARSENIOUS ACID AND ALBUMEN,

CONSIDERED IN ITS RELATIONS TO LIEBIG'S THEORY ON THE ACTION OF INORGANIC POISONS.

BY THORNTON J. HERAPATH,

Assistant Lecturer on Practical Chemistry in the Bristol School of Medicine, &c.

In a letter which was inserted in a recent number of this periodical, I stated that it was my intention to undertake a new series of experiments on this subject, with the view of confirming or disproving my former results. In accordance with this promise, most of the time that my professional duties have left at my disposal, since the date of that communication, has been devoted to this inquiry. My results are subjoined; and as I now wish to conclude this controversy, and at the same time render the present memoir as complete as possible, I have thought it advisable to include in it the experiments I have already made public, whose accuracy a repetition has enabled me, I hope, to place beyond dispute.

In again entering upon this investigation, I proposed to myself certain questions, which I shall endeavour to answer successively in the following pages.

1. *Does arsenious acid precipitate albumen from its solutions in the cold, and if so, under what circumstances?*

Experiment I.—The white of an egg was beaten up with water, and the mixture so produced filtered through very fine muslin, in order to separate the white membranous particles that floated through the solution. The slightly opalescent filtrate was then added to a cold saturated solution of arsenious acid in water, containing six grains of crystallized acid. The whole having been introduced into a bottle, and well shaken together, in order to produce an intimate mixture, it was set aside in a gas stove heated to 98° Fahr.; but no precipitate was produced, even after the lapse of several hours. The transparency of the albuminous solution was not in the slightest degree affected by the presence of the arsenious acid.

Experiment II.—The same experiment repeated, the only difference being that the free alkali of the white of egg was first neutralized by a little acetic acid, before the addition of the arsenical liquid. Similar results were obtained.

Experiment III.—In this experiment advantage was taken of the property which borax possesses, of dissolving a large quantity of arsenious acid without entering into chemical combination with it. Thirty grains of the latter substance were therefore boiled with a weak solution of the salt above mentioned, which was employed only in just sufficient quantity to effect the object desired. The liquid was then filtered, and intimately mixed, by long-continued agitation, with 436·5 grains of the glairy albumen of eggs. No coagulation, however, was produced; neither was any precipitate formed, upon allowing the solution to remain undisturbed for several days in a chamber heated to 98° Fahr.

Experiment IV.—Experiment III. repeated. In this case, however, the free alkali of the white of egg was first neutralized by passing through the solution, a current of pure carbonic acid gas. Similar results were obtained.

2. *Can these two bodies be induced to combine together by the agency of heat?*

Experiment V.—499 grains of the glairy albumen of eggs were taken and intimately mixed, by long-continued trituration, with 3·0 grs. of arsenious acid; the latter having been previously dissolved in a quantity of water sufficient to effect a perfect solution. The mixture was then coagulated by heat, and afterwards carefully evaporated to dryness in a water-bath. The yellowish residue thus obtained was reduced to a very fine powder in a mortar, and repeatedly digested, for several hours together, in boiling water; care being taken to reduce the compound to a still more minute state of division, by patient trituration in a mortar, after each digestion, &c. The washings, (even those portions which first passed through the filter; *i. e.*, before the pulverization of the compound was commenced,) on being treated by Reinsch's process, were found to contain a large proportion of arsenious acid.

The insoluble residue having been digested in water for about twelve or fifteen hours, as before described, was dried and weighed. It amounted to about 29 grs. It was then boiled in strong hydrochloric

acid, when it dissolved, with the characteristic colour of the proteine compounds. Upon testing this solution in the usual manner, only exceedingly minute traces of arsenic could be detected; a quantity insufficient to yield, on oxidation, a perceptible sublimate of arsenious acid.

Experiment VI.—According to Dr. Muspratt, 61·07 grms. of albumen will combine with 0·386 grm. of arsenious acid = 0·632 per cent. If this statement be correct, I argued, that if I make a mixture of these two substances, so arranging my experiment that the arsenious acid shall not be present in such large quantity, or in other words, if I employ an excess of albumen, and evaporate the compound to dryness, no trace of arsenious acid ought to be extracted from the mass upon subsequent digestion in boiling water. 438·5 grs. of glairy albumen were therefore mixed with an aqueous solution of arsenious acid, containing 0·25 gr. of $As O^3$. The mixture was evaporated to dryness in a gas oven, and the brittle residue thus obtained treated as in the preceding experiment. The washings, when tested by Reinsch's process, gave evident tokens of the presence of a large quantity of arsenic. The insoluble residue, however, when decomposed in the usual manner by sulphuric acid and heat, and afterwards introduced into Marsh's apparatus, gave but very faint stains of metallic arsenic.

Experiment VII.—Experiment VI. repeated, the same quantities of arsenious acid and albumen being used. Instead of evaporating the mixture to dryness, however, as before, it was merely heated to the boiling-point and then filtered, in order to separate the coagulum which was formed. This latter was then divided into two portions; one of these was treated by Reinsch's process, and found to contain sensible quantities of arsenic, as did also the liquid from which the coagulate had been separated; in either case bright steel-gray stains being formed upon the copper; the other half, on the contrary, was triturated for several minutes in a mortar with about twice its weight of pure quartzose sand, afterwards boiled in water, and treated as in the former experiments. Upon subsequently testing it by Reinsch's process, only very faint and doubtful traces of arsenic were discovered.

Experiment VIII.—483 grs. of albumen were mixed with 3·0 grs. of dissolved arsenious acid. The mixture was then coagulated by heat, and treated as before. The washings, having been carefully collected and evaporated to dryness, left a yellowish residue, which was redissolved in boiling water. The latter solution was filtered, in order to remove some few flocculi of albumen which had passed through the pores of the muslin strainer; it was then acidulated with hydrochloric acid, and treated with sulphuretted hydrogen, a stream of which was passed through it, until the liquid smelled strongly of the gas. The solution was then heated, in order to dispel the excess of hydrosulphuric acid, and the precipitate of tersulphide of arsenic formed separated by filtration. When dried at 212° Fahr., it was found to weigh 3·63 = 2·921 grs. $As O^3$.

Experiments IX., X., and XI.—Nos. IV., V., and VI. repeated, substituting the serum of the blood for white of egg. Similar results were obtained.

3. *Will arsenious acid combine with any other proteine compound of the body?*

Experiment XII.—A quantity of muscular fibre was prepared by washing the lean part of the flesh of an animal for some time in a stream of water until all the soluble parts were extracted. It was then subdivided into filaments, and digested for two or three days in an aqueous solution of arsenious acid, containing the one-hundredth part of a grain of that substance. At the end of the above period the fibre was separated from the liquid, well washed with lukewarm water, dried, and weighed. It was found to amount to 120 grains. It was then boiled in dilute hydrochloric acid, and tested by Reinsch's process; only exceedingly minute traces of arsenic could be detected. The solution, however, which had been filtered from it, furnished a dark steel-gray coating on the copper, when similarly treated.

Experiment XIII.—The preceding experiment was repeated, substituting pure caseine for muscular fibre. Similar results were obtained.

4. *Does albumen act as an antidote to arsenious acid?*

Experience has already answered this question in the negative.

5. *Is the so-called arsenite of albumen really innocuous?*

Experiment XIV.—The whites of three eggs, weighing altogether 1624 grs., were mixed with water and 6·5 grs. of dissolved arsenious acid. The mixture, having been evaporated to dryness, was finally comminuted, mixed with food, and administered to a cat. Having eaten about a fifth or a quarter of the powder, the animal refused to take the remainder; in a short time it exhibited considerable uneasiness, vomited repeatedly, and was soon afterwards attacked with all the symptoms of arsenical poisoning. It lingered on, however, in a state of extreme torment, for two or three days, and then died, refusing food to the last. No *post-mortem* examination of the body was made; my time being then much occupied with matters of importance.

In opposition to the above results, it has been urged, that the poisonous properties of the compound so prepared were to be attributed to the presence of a small quantity of arsenite of potash (soda), which was formed by the combination of some of the arsenious acid with the free alkali of the white of egg. In order to overcome this objection, I repeated the experiment, employing 1856 grains of glairy albumen, and 8·1 grains of arsenious acid, evaporated the mixture to dryness, reduced the residue to a coarse powder, and digested it for twelve hours in moderately strong spirit, made by mixing together two parts by volume of commercial spirit of wine and one part of water. This liquid, I may observe, readily dissolves arsenite of soda, though it apparently takes up but a very small quantity of arsenious acid. At the expiration of the time before mentioned, the fluid was expressed, and the albuminous mass again washed twice or thrice with the weak spirit, care being taken to employ no more of the latter than was absolutely necessary.* The residuary compound was afterwards dried in a water-bath, and reduced

* By a comparative experiment, I assured myself, that all but the faintest trace of arsenite was extracted from an albuminous coagulate, containing arsenite of soda, by this process.

to a fine powder, a portion of which was given to a cat. In a short time after taking the dose, the animal was seized with violent sickness, and appeared to suffer much pain. It partly recovered, however, and therefore, on the next day, a further quantity was administered, whereupon it was again attacked with similar symptoms, and died. Upon making a *post-mortem* examination of the body, the mucous surface of the stomach and intestines was found to be much inflamed, and upon examining portions of those organs by means of Reinsch's test, distinct traces of arsenic were detected.

Now, if any reliance can be placed upon the experiments just detailed, it is evident that the arguments for and against the existence of a definite compound of arsenious acid and albumen may be thus summed up :—

For.

1. The coagulum that is formed upon boiling an albuminous solution in the presence of arsenious acid always contains minute traces of the latter substance, which it is exceedingly difficult to remove, even by long-continued digestion in boiling water.

Against.

1. Albumen, when in solution, is *not* precipitated by arsenious acid or an alkaline arsenite.

2. The so-called arsenite of albumen, or albuminate of arsenious acid (coagulated albumen contaminated by minute traces of arsenious acid), may be deprived of every trace of arsenic by digestion in boiling water.

3. The pseudo arsenite, even when prepared with the greatest care, so as to avoid all admixture with an alkaline arsenite, is decidedly *poisonous*.

4. Albumen is *not* an antidote to arsenious acid.

5. Arsenious acid when digested with a large excess of muscular fibre or casein, does not combine with them, or disappear from the solution.

The difficulty that is experienced in removing the last traces of arsenic from the albuminous coagulate, as I have already pointed out, is evidently caused by the peculiar structure of the enveloping material, and not by a true combination occurring between the two substances. My recent investigation, therefore, has only served to confirm me in the conclusion I had previously formed on this subject: namely, that Liebig's hypothesis on the inorganic poisons, so far as regards arsenious acid, is not supported by experiment, and hence must be considered as untenable.

Mansion House, Old Park,
Bristol, May 13th, 1852.

ON THE SACCHARINE STRENGTH OF SYRUP OF IODIDE OF IRON.

BY W. TOZIER.

According to the authority of M. Guibourt, the most perfect simple syrup consists of 30 parts of sugar to 16 of distilled water, the specific gravity of which syrup is represented by 1·320; for practical purposes, however, double the amount of sugar as of liquid menstruum has been found more convenient, and is now eligibly adopted in the preparation of the syrups of the Dublin and London Pharmacopœias. It is a matter of surprise that in this partitioning of the quantities of sugar and water, the syrup under consideration should have formed a remarkable exception to this rule, as there is scarcely another instance amongst those compounds where the conservative character of the compound depends more on its due proportion of sugar. In the Dublin syrup, this deficiency is very perceptible, giving to it an instability of character that detracts much from its value, a matter of no small importance to the dispenser, as he cannot with facility reduce it to his extemporaneous formulary, without incurring a certain amount of trouble and some expense in its preparation, both of which might have been readily obviated by a slight modification of the present formula. This, no doubt, may be referred to a desire of the College, to get rid of the inconvenience attending the solution of the sugar, in the second part of the process, by the introduction of simple syrup, and by this means abridge the length of the operation, and to a certain extent divest it of a portion of its complexity; but as this cannot be done without proportionately increasing the liquid portions of the compound, there will be found a perversion of the object, as the resulting syrup is so weak in saccharine strength as to be most favourably disposed to decomposition *in limine*. Indeed, this would scarcely demand to be demonstrated, it is so evident; for as the 6 fluid ounces of simple syrup employed, contain but 5·33 parts of sugar by weight, there will be required 5·33 parts of fluid necessary to bring it up to its required amount of 8 ounces. If we correct this deficiency by reducing the syrup to the saccharine strength of simple syrup, which should properly form the type of these compounds, the 8 fluid ounces indicated should possess, independent of its saline constituent, 7·11 parts of sugar by weight; for as this amount is represented by 1·330 + 8 = 10·64 ounces, the proportions necessary will be 7·11 parts of sugar, and 3·55 of the solution of iodide of iron, to occupy this bulk, showing a deficiency of 1·78 parts of sugar in the present form, which are necessarily made up by the addition of distilled water. In the London formula a similar deficiency is found to exist, but not, however, to the same extent; for were we to ascribe the due amount of sugar to the 15 fluid ounces of syrup there indicated, we should find that it would be necessary to employ 13·33 ounces by weight, Avoirdupois (12·14 Troy), in place of the 10 ounces at present, for 1·333 + 15 = 19·9 ounces by weight, or 13·33 sugar + 6·66 liquid iodide of iron, assuming the specific gravity of the London simple syrup to be similar to that of the Dublin, which it is very nearly. If we take the Edinburgh formula to represent the true proportion of sugar necessary,

the London formula should be represented by 11·25 ounces Troy, in place of the 10 ounces at present employed, and the Dublin by 6 ounces Troy or 6·255 Avoirdupois, in place of 5·33 ounces; but in this there is a deficiency likewise, as the 4½ ounces there, should be more correctly represented by 4·85 ounces, or something better than 4¾ ounces Troy.

These discrepancies at first sight appear insignificent, and probably unworthy of much attention; however, as accuracy should characterize all our operations, and as the value of a compound very much depends on it, any deviation from this rule, especially in so sensitive a preparation, seems to a certain extent unwarrantable. When the solution of iodide of iron is treated with double its weight of sugar, it is found to keep admirably well for a considerable period, especially when protected from the air and light, and in a cool situation, taking care in the first instance, after the solution of the sugar is effected, to bring it near its boiling point, and in this state, seclude it in bottles perfectly air-tight. As these need only contain from two to three ounces each, and can be conveniently kept in stock, there will be less likelihood of their contents spoiling, than when a large quantity of the syrup is kept in a dispensing bottle, the desultory opening of which, from time to time, rapidly produces this change. It might be urged, that the amount of salt it contains, would necessarily dispose it to crystallization, with the above amount of sugar, and at once frustrate the object of its conservation; this, however, will be found not the case, as it shows no symptom of crystallization under the circumstances, at least, for a very considerable time, which is another very important reason for employing this quantity of sugar.

The following formula is suggested as presenting a useful innovation of the Dublin process, as it will be found, owing to the omission of a portion of the manipulation there directed, not to assume a more complex form, nor less calculated to effect a good product.

Take Pure iodine, ...	5	drachms.
Iron turnings, separated by the magnet,	6	drachms.
Distilled water, ...	3½	ounces.
Powdered sugar, ...	7	ounces.

Introduce the iodine, iron, and 2½ ounces of water into a glass flask; rotate in the hand for some minutes, until the solution loses its red colour and becomes unaffected by cold amidine. Filter the solution in the sugar, washing the residue with the remaining portion of water, and dissolve, by the aid of a water bath.

The above proportions, when combined, will measure exactly 8 fluid ounces; should there, however, be any deficiency, it may be made up by the addition of simple syrup.

The iron, it will be observed, is taken in double the pharmacopœial quantity, as this amount is found to expedite the operation more rapidly, without having any undue influence otherwise, while the application of heat during the first part of the process is altogether avoided, as the whole amount of syrup, viz. 8 ounces, contains 333·82 grains Avoirdupois of protiodide of iron, the proportion in each fluid drachm will be found to be 5·21 grains.

This concentrated form is an advantage in a pharmaceutical point of

view, as it can be easily reduced to any given strength by the addition of syrup, orange-flower water, or other vehicle, at the will of the practitioner; it is also less likely to spoil, from being less exposed to atmospheric agency. I am disposed to think, that from the number of attempts made to reduce this compound to what might be thought more eligible forms in medical practice, all have failed to realize the test of experience, except this alone; for, chemically and medically considered, I believe it to be a most interesting and valuable preparation for the different objects of its use.

KINGSTOWN.

THE CHEMICAL COMPOSITION OF COD-LIVER OIL.

BY DR. H. L. WINCKLER.

OF all the drugs which have been introduced into medical practice within the last ten years, none has excited so much attention, and has met with so favourable a reception, as cod-liver oil. To what principle its peculiar properties are to be referred, has not yet been ascertained. By some they have been attributed to the presence of a small quantity of iodine; but this has not proved a satisfactory explanation. Many chemists have endeavoured to solve this problem, but without success. Amongst others, Dr. de Jongh, who attributed its virtue to gaduin—a new principle which he had discovered in the oil, with the usual fatty acids, and some of the constituents of bile, and traces of iodine and bromine.

The results of my researches are different, in an important degree. According to my experience, cod-liver oil is *an organic whole* of a peculiar character, differing in its chemical compositon from any of the fat oils which have been heretofore applied to medical purposes.

The evidences for this conclusion are the following:—

1. When the clear, pale sort of cod-liver oil is saponified with potash, and the resulting soap treated with tartaric acid, oleic and margaric acids are obtained.

2. When a mixture of six parts of caustic potash, twenty-four parts of distilled water, and twenty-four parts of cod-liver oil, after being allowed to remain at an ordinary temperature, and often shaken, and finally diluted with twenty-four parts of distilled water, is distilled, a distillate is obtained, which possesses an intense odour of cod-liver oil, and contains an appreciable quantity of a peculiar organic compound, namely, oxide of propyl.

3. When nine parts of cod-liver oil are saponified with five parts of oxide of lead, with the necessary quantity of distilled water, in a porcelain vessel, by the heat of a water bath, the oil is decomposed into oleic and margaric acids, and a new acid, propylic acid. The chief part of this acid combines, like the oleic and margaric acids, with the oxide of lead, as it appears, to form a basic compound; and another lead-salt, probably an acid one, can be washed out of the plaister with distilled water. It is worthy of remark, that no glycerine is formed in this process. The plaister smells of train oil and herrings; and when it is

exposed in a thin layer to the action of the atmosphere in a water-bath, it becomes coloured dark brown, after the evaporation of the water; and by the same means it loses its penetrating odour. The cause of the colouring is due to the strong disposition which the salts of propylic acid possess to oxidize, and consequently, to become brown. When the solution of the acid propylate of lead is treated with sulphuretted hydrogen, after the separation of the sulphuret of lead, is obtained an entirely colourless and strongly acid reacting solution, which, by evaporation in a water-bath, becomes by degrees coloured. At the commencement of the last part of the operation it loses its penetrating odour, and at last leaves a dark brown residue. Exactly in the same manner, the watery solutions of neutral propylates of barytes and ammonia behave themselves. The neutral, colourless and undecomposed ammoniacal salt smells of herrings; and the baryta salt, as concentrated decoction of meat.

4. When the before-described (No. 2) solution of cod-liver oil soap is thrown into a capacious distillatory apparatus, with the addition of caustic lime and chloride of ammonium, (in the proportions of six drachms of caustic potash, three ounces of cod-liver oil, six ounces of water, six ounces of fresh-burnt lime, and one drachm of chloride of ammonium;) with the precaution, that the mixture of lime and chloride of ammonium be not added until the soap is formed in the retort, so that it may penetrate thoroughly the mass, and the distillation proceeded with by means of a gentle heat, as the formation of hydrate of lime evolves considerable heat, there distils rather quickly a clear, watery fluid, over which is a concretated solution of propylamin free from ammonia. By saturating this solution with diluted sulphuric acid, and adding alcohol, sulphate of propylamin readily crystallizes out of it.

The simple experiment serves to prove, with certainty, that cod-liver oil contains oxide of propyl. The propylamin thus obtained possesses all the properties of that obtained from the pickle of herrings, or ergot of rye.

Cod-liver oil, by saponification with potash, is separated into oleic and margaric acids, and *oxide of propyl*; and with oxide of lead, into oleic and margaric acids, and propylic acid—a higher result of the oxidation of propyl,—and gives by either process of saponification no *hydrate of the oxide of glycyl.* The glycyl (C_6 H_3) is in this oil replaced by propyl (C_6 H_7). Only in cod-liver oil are the conditions offered for the formation of propylamin (N H_2, C_6 H_7), by the presence of ammonia, as all the fat oils employed in medicine are free from this substance; therefore none of these oils can be substituted for cod-liver oil.

[Should this research of Winckler, as to the existence of the hyrate of the oxide of propyl in combination with the fatty acids in cod-liver oil, be confirmed, it will establish an important fact in chemistry, and may explain the therapeutic action of that remedy which has heretofore puzzled both chemists and physicians. The combinations of the radical propyl have been previously only known as artificial productions; therefore Winckler's experiments, if true, show that they exist in nature, or, in other words, that they are educts, and not products, from

cod-liver oil. Moreover, the presence of oxide of propyl, and the absence of oxide of glycyl in cod-liver oil, will enable chemists to distinguish by tests, with certainty, this oil from other fatty oils.]—— *Editors of Annals, &c.*

ON PILULA FERRI COMPOSITA.

BY WILLIAM DICKINSON.

Last month a paper was read by Mr. Davenport, before the Pharmaceutical Society, on this pill mass of the London Pharmacopœia, wherein he stated that when it was "prepared strictly according to the instructions given, the proto-carbonate first formed soon passed into the state of peroxide of iron;" and "that any one conversant with the nature of the decomposition which takes place on adding a liquid to the mixed salts, must be aware that carbonic acid continues to be disengaged some time after the mixture has been made, and this would cause the pills to swell out to three or four times their original size."

If Mr. Davenport means, by the passage first quoted, that a perfect pill mass containing proto-carbonate of iron cannot be made at all by mixing the ingredients ordered by the College, I beg to dissent entirely from his criticism of that formula. I am perfectly aware that this cannot be accomplished by following the directions of the College as to the order in which they are to be mixed, namely, "Rub the myrrh, with the carbonate, in a vessel previously warmed; then, the sulphate being added, rub them again; afterwards heat the whole together to form a mass." But the result is a good one, unquestionably, when the ingredients are mixed by rubbing the sulphate of iron with the treacle in a mortar previously warmed, and then adding the carbonate of soda, and again triturating the mixture until carbonate of the protoxide of iron and sulphate of soda are formed by double decomposition; afterwards adding the myrrh, and beating the whole into a mass. A pill mass thus prepared retains the iron in a state of proto-carbonate, which is proved by its not swelling, which would be inevitably the case were the iron salt peroxidized, in consequence of the carbonic acid becoming free. Sugar, which was ordered in the previous edition of the Pharmacopœia, might with great advantage replace the treacle ordered in this formula; because there is quite sufficient liquid obtained from the water of crystallization of the salts employed, which water becomes uncombined when the double decomposition takes place, to form a soft pill mass; and moreover, weight for weight, sugar possesses a greater preservative power on the carbonate of iron than treacle, which, besides, contains variable quantities of saccharine matter and water.

After all, putting the worst construction on Mr. Davenport's ambiguous criticism concerning this formula, it is not half so unscientific and absurd as the tedious and impracticable process he proposes for a remedy, which is as follows:—"Decompose the carbonate of soda and the sulphate of iron ordered in the formula in the way usually adopted for the preparation of proto-carbonate of iron; collect the precipitate on a linen filter, and separate the liquor as far as possible by expression;

and to the pressed mass put a quantity of refined sugar, equal to the treacle ordered, and evaporate the mixture to dryness in a water-bath; then evaporate the liquor containing the sulphate of soda to dryness, and add it to the preceding powder, together with the myrrh ordered in the formula. This mixture, in which the iron is in a state of proto-carbonate, will keep unchanged in a bottle excluded from light; and it may be readily made into pills by the addition of a little water, when required for dispensing."

Every person who has made the saccharated carbonate of iron knows that it is impossible, by this process, to prevent a partial peroxidation of the iron; consequently, Mr. Davenport's remedy is at least as bad as the disease which he imagines to exist in the London Pharmacopœial formula.

Any dispenser who doubts the truth of my criticisms on Mr. Davenport's objections to the London formula, and on his remedy, may readily remove his doubts by following the order of mixing which I have suggested, and by substituting sugar for treacle, to carry out my method under the most favourable conditions. In this case the saccharine matter, which possesses the property of preventing the protoxide of iron passing into peroxide, is in absolute contact with the salt of iron before it is decomposed by the carbonate of soda; and therefore it exercises its preservative agency at the first moment of the formation of the proto-carbonate; whereas, by Mr. Davenport's process, the proto-carbonate is of necessity exposed for some time to the oxidizing agency of the atmosphere, which is also the case when the order of mixing prescribed by the London Pharmacopœia is strictly obeyed.

May 4th, 1852.

PRACTICAL REMARKS ON SPIRIT OF WINE.

BY THOMAS ARNALL.

The strength of spirit of wine is, by law, regulated by proof spirit sp. grav. 920) as a standard; and accordingly as it is either stronger or weaker than the above, it is called so much per cent. above or below proof. The term *per cent.* is used in this instance in a rather peculiar sense. Thus, spirit of wine at 56 per cent. overproof, signifies that 100 gallons of it are equal to 156 gallons of proof spirit; while a spirit at 20 per cent. underproof, signifies that 100 gallons are equal to 80 gallons at proof. The rectified spirit of the Pharmacopœia is 56 per cent. overproof, and may be reduced to proof by strictly adhering to the directions there given, viz., to mix five measures with three of water. The result, however, will not be eight measures of proof spirit; in consequence of the *contraction* which ensues, there will be a difficiency of about ℥iv. in each gallon. This must be borne in mind in preparing tinctures.

During a long series of experiments on the preparation of ethers, it appeared a desideratum to find a ready method of ascertaining, how

much spirit of any density would be equal to one chemical equivalent of absolute alcohol. By a modification of a rule employed by the Excise, this question may be easily solved. The Excise rule is as follows:—

To reduce from any given strength to any required strength, *add* the *overproof* per centage *to* 100, or *subtract* the *underproof* per centage *from* 100. Multiply the result by the quantity of spirit, and divide the product by the number obtained by *adding* the *required* per centage overproof, or *subtracting* the *required* per centage underproof, to or from 100, as the case may be. The result will give the measure of the spirit at the strength required.

Thus, suppose you wished to reduce 10 gallons of spirit, at 54 overproof, down to proof, add 54 to 100 = 154; multiply by the quantity, 10 gallons (154 × 10) = 1540. The required strength being proof, of course there is nothing either to add to or take from 100; therefore, 1540 divided by 100 = 15·4 gallons at proof; showing that 10 gallons must be made to measure 15 gallons, 3 pints, 4 fl. oz., by the addition of water.

To ascertain what quantity of spirit of any given strength will contain one equivalent of absolute alcohol.—Add the overproof per centage of the given spirit to 100, as before; and with the number thus obtained divide 4062·184. The result gives in gallons the quantity equal to four equivalents (46 × 4).

Example.—How much spirit at 54 per cent. overproof is equal to 1 equivalent of absolute alcohol?

Here,

$$54 + 100 = 154 \text{ and } \frac{4062 \cdot 183}{154} = 26 \cdot 3778 \text{ galls., or } 26 \text{ galls. } 3 \text{ pts.}$$

which, divided by 4, gives 6 gallons, 4 pints, 15 oz.

Suppose the spirit to be 60 overproof,—

$$\text{then } \frac{4062 \cdot 183}{100 + 60} = 25 \cdot 388 \text{ gallons, } \left\{ \begin{array}{c} \text{one-fourth of which is equal to} \\ 6 \text{ gallons, } 2 \text{ pints, } 15\tfrac{1}{2} \text{ oz.} \end{array} \right.$$

This rule is founded on the following data. As a gallon of water weighs 10 lbs., it is obvious that the specific gravity of any liquid multiplied by 10 will give the weight of one gallon. The specific gravity of absolute alcohol is ·793811; hence, the weight of 1 gallon will be 7·93811 lbs., and its strength is estimated at 75·25 overproof.

$$4 \text{ equivalents of alcohol} = 46 \times 4 = 184,$$

and

$$23 \cdot 17936 \text{ gallons} \times 7 \cdot 93811 \text{ lbs. per gallon, also} = 184 \cdot 0003094.$$

Hence it appears that 23·17936 gallons of absolute alcohol are equal to 4 equivalents. By adding the overproof per centage (75·25) to 100, and multiplying by the quantity (23·17936 gallons) we get the constant number 4062·183.

The rule might have been calculated so as to show *at once* the equivalent, without dividing by 4; but it would have required several more places of decimals: it will give the required quantity to a fraction of a

fluid drachm. I have estimated the equivalent of alcohol at 46, or as

H	6	. . . . .	= 6
O	2	. . . . .	= 16
C	4	. . . . .	= 24
			46

This is double the weight assigned by Phillips.

PONTEFRACT.

ANALYSIS OF A MINERAL WATER.

BY WILLIAM BASTICK.

THE water submitted to analysis was obtained from a spring in Holkham Park, the seat of the Earl of Leicester. Its specific gravity at 62° Fahrenheit was ascertained to be 1,0005; that it was a chalybeate water, became evident from the red ferruginous deposit which took place in it when allowed to remain exposed to the air for a short time. The following substances, and their respective amounts, were found to be present in an imperial gallon of the water:—

	Grains per imperial gallon.
Silica	,1081
Peroxide of Iron	,9265
Lime	8,0841
Magnesia	1,0759
Sodium	1,1136
Chlorine	2,4352
Sulphuric Acid	,7961
Carbonic Acid	6,4860
Organic matter	a trace
Total	21,0255
Total amount of solid contents estimated by direct experiment	20,9551

The subjoined table exhibits the mineral constituents in the order of combination in which they exist originally in the water, according to their affinities.

	Grains per imperial gallon.
Silica	,1081
Carbonate of Protoxide of Iron	1,3434
Carbonate of Lime	13,4407
Sulphate of Lime	1,3533
Carbonate of Magnesia	1,0921
Chloride of Magnesium	1,2364
Chloride of Sodium	2,8324
Total	21,4064

THE PHARMACY BILL.

The Select Committee of the House of Commons has so thoroughly mutilated the chief provisions of the Pharmacy Bill, that it has become nothing but a bill confirmatory of the charter of the Pharmaceutical Society, with a few slight amendments. This unsatisfactory result has arisen from several causes, among which may be enumerated the strong opposition that the Bill has encountered from the general practitioners. From a want of foresight, this opposition was not provided against by examining sufficient witnesses in its favour at the outset. Without wishing for one moment to detract from the merits of the member who introduced the Bill into Parliament, and whose perseverance we willingly acknowledge, we must say that, had its advocacy been in less feeble hands, the issue would not have been so near a total defeat; and we will add that, however unfortunate for the best interests of the Pharmaceutical Society many of his acts and views have been, the pharmaceutists of this country are under deep obligations to that gentleman for attempting a task to which neither the Government nor any other member would give the least assistance, by way of introducing a bill into Parliament.

The Bill, as amended by the Committee, confers no exclusive privileges on the Pharmaceutical Society, further than the one that no persons except its members can call themselves pharmaceutists or pharmaceutical chemists. It leaves to anybody the privilege of assuming the title of chemist and druggist, or any other except the two named, and of practising all or any departments of the business as at present. It must be borne in mind that such a bill as the one we have described, although recommended by a Committee of the House of Commons, will not necessarily become a law. It may be further amended or rejected in the House of Commons. If it should reach the House of Lords it may be subject to the same treatment, and even opposed by those who have used their best efforts to prevent it passing at all. Let the worst result happen, pharmaceutists will not have much cause to grieve, for the present Bill is scarcely worth their acceptance. The only thing that can be said in its favour should it become law, is that Parliament has recognized the necessity of distinguishing by a title the pharmaceutist who has joined the ranks of the Pharmaceutical Society, whether by examination or otherwise, from him who has not done so, without any other privilege or advantage being withheld from the latter, which is at present enjoyed by both, and which is equivalent to—nothing.

ANNUAL REPORT OF THE COUNCIL OF THE PHARMACEUTICAL SOCIETY.

In justice to the members of the Pharmaceutical Society who have not been behind the scenes, we think it right that they should be informed how and by whom that tissue of misstatements, the Annual Report (worthy of the special pleading of an Old Bailey barrister), is concocted.

About two months before the annual meeting of the Council of the Pharmaceutical Society, a committee is formed to draw up the Annual Report. Especial care is taken so to constitute the committee, that the immaculate member for St. Albans is associated in it with men who either cannot attend, or who are ready to endorse everything he does or says. However, this precautionary measure would not suffice alone to enable this gentleman to carry out his designs, for the Council must adopt the Report, to render it valid; and this would be a measure of some difficulty, when there are men on the Council who will not connive at any deception or false statement. To get over this difficulty, it must be smuggled through the Council. The manner in which this feat is performed is a simple one. At the meeting of the Council which follows that which appointed the Report Committee, it is expected, by those who are verdant in such matters, that the Report will be brought up, discussed, and, if approved by a majority, adopted or if not thus approved, altered. No such course is taken, for the obvious reason that discussion has a tendency to dispel delusions, and to expose fallacies and trickery. To avoid this discussion, the Report is not ready, because, as the Council is told, that gentleman has not had time to write it. It should be observed, that many members of the Council, with an abasement characteristic of that which is considered by them the highest qualification for the honour and position they enjoy, and without which they know full well they are doomed to sink back into their natural insignificance, by an ingenious piece of machinery which is put in motion at the annual election, consider that no other member of the Council, besides the one alluded to, can write half-a-dozen words of good English consecutively, and therefore, that he alone is competent to draw up the Report.

The consequence of these combined circumstances is, that the Report is not considered by the Council until half an hour before the time at which the annual meeting must take place. The greater part of these thirty minutes being occupied by the secretary reading it, there is just sufficient time left for the majority to remark, what a wonderful magician the individual must be who wrote it, and to adopt the same, with loud tokens of their approbation of this one of the many emanations of his

genius. In fact, any man must be a genius, who can from the most ugly facts and materials, by a few touches of his pencil, draw such very pleasing pictures of progress and prosperity.

Our readers may probably think that we have written a romance as to the manner in which the Annual Report is concocted and adopted by the Council; but we can assure them, that jocular as our account may appear, we defy any man to contradict one word which we have written, having been witnesses of the proceedings here detailed, or we could scarcely have credited the account ourselves.

We are perfectly aware of the charge that will be made against us for the statement that we have written, namely, that we are in some measure responsible for this state of things. We shall not attempt to refute it, except by remarking, that in directing bodies whose proceedings are secret, the acts and views of a minority never reach the public eye or ear.

After this digression we must return to the Report, by stating that the portion of it which speaks of the School of Pharmacy is a series of statements, from beginning to end, which we shall not condescend to call by their proper name, and appears to be written for the purpose of persuading the members to submit to its enormous cost, and to inveigle pupils to study in the school, to put money in the pocket of the director of the laboratory.

The first statement in it that we shall notice is, that prior to the establishment of the Society's School of Pharmacy, there were no schools where the pharmaceutist could be educated; which is tantamount to asserting that there were no schools where theoretical and practical chemistry, botany, and materia medica were taught, because these subjects form the *curriculum* of education in the Society's school. After this, we shall expect to hear in the next Report that there were no professors of chemistry, botany, and materia medica, until the existence of the establishment in Bloomsbury Square. The second is, that the school is a model one; that is, one worthy of imitation. We can only say, Heaven defend the pharmaceutical community from copies of any such model school! A model school, indeed, where the director of its laboratory, never having had any preliminary education for his office, is obliged to teach himself at the cost of the Society before he can instruct his pupils! A very pretty specimen of a model school, in comparison with that of the University College, with Mr. Graham for its Professor; that of the Royal College of Chemistry, with Dr. Hofmann; and that of St. Bartholomew's Hospital, with Dr. Stenhouse.

The last assertion, which is a barefaced statement—for Councils never blush—is, that "the School of Pharmacy in Bloomsbury Square is the only one in the kingdom which comprises all the branches of

instruction required by the pharmaceutical chemist." This paragraph could never have appeared on the authority of an individual member; for, however we may estimate the Council as a whole, we do not believe there is one of them who would have the moral turpitude to append his name to such an assertion. Need we repeat that the branches of instruction required by the pharmaceutical chemist are botany, materia medica, and chemistry, and ask this Council if they never heard of lectures being delivered by really able men on these subjects at more than thirty public institutions in this country, many of which have laboratories for practical experience and teaching?

Let not the unwary student be entrapped by this puffing Report, containing as it does such exaggerations and misstatements, which, when coming from the proprietors of Holloway's ointment or Morison's pills, are often characterized as criminal, and which, therefore, when emanating from an institution otherwise respectable, deserve an epithet which we forbear to apply.

PHARMACEUTICAL STATISTICS OF THE KINGDOM OF WURTEMBERG.

Dr. Haidlin, of Stuttgardt, has communicated to a general meeting of the apothecaries of Wurtemberg the following statistical account of the pharmaceutists of that kingdom, which contains 1,300,000 inhabitants.

Pharmaceutists as principals,	217
Ditto as assistants,	167
Ditto as apprentices,	104
Ditto which have three assistants,	3
Ditto which have two apprentices,	4
Ditto which have two assistants,	21
Ditto which have one apprentice,	95
Ditto which have one assistant,	119
Ditto without assistants,	75
Ditto without assistants or apprentices,	31

Dr. Haidlin calculates that each principal or assistant transacts business to the amount of 2000 florins annually, and each apprentice 1000 florins. The retail price of medicines, which is fixed by government, allows a profit of 17 per cent. on the returns. The receipts of the largest business are about 9000 florins yearly, and the smallest about 1000 florins. The average returns of a pharmaceutist in Stuttgardt are reckoned at 6000 florins. A florin is about the value of twenty pence sterling.

Reviews.

Grundriss der Organischen Chemie, *von* Dr. Carl Löwig, *Ordentlichen Professor der Chemie, an der Universität zu Zürich.* Braunschweig: Druck und verlag von Friederich Vieweg und Sohn. 1852.

Outlines of Organic Chemistry, *by* Dr. Charles Löwig, *Ordinary Professor of Chemistry at the University of Zurich.* Brunswick: Frederick Vieweg and Son. 1852.

By introducing this profound work to the notice of the British chemical community, and diffusing a knowledge of its truly philosophical contents, we feel that we are performing a duty which we owe to science. Every student of organic chemistry must have deplored the frightful chaos which has arisen in this department of experimental science, from the enormous mass of facts which the industry of its explorers has called into existence, and which, for the want of a master mind to classify them, have lain scattered in confusion apparently inextricable.

The author of this work has been long favourably known to the readers of the chemical literature of Germany, for having written perhaps the best and fullest account which has ever appeared of the chemistry of organic compounds. His particular talent seems to be in forming into a systematic whole the isolated facts and discoveries of other men. In short, what lasting services Newton and Kepler rendered to astronomy, and Linnæus and De Candolle to botany, he seems destined and desirous to perform for organic chemistry; for he observes, in the preface to these "Outlines,"—

"Since the appearance of my 'Chemistry of Organic Compounds' the quantity of facts has increased in an important degree, but none of these facts has induced me to abandon the system which I then in general followed; on the contrary, the new discoveries have only contributed to fortify the system then pursued. Many views, certainly, which I then ventured to express with timidity, have been in so surprising a way confirmed, that I now feel no hesitation to adopt them as the foundation of the present work. Still more has it become evident that organic compounds, when their united relations and not merely their individual characters are reviewed, belong to precise groups, which resemble the natural families of plants, and that these groups are by a common bond united with one another. The philosophy of organic chemistry shall clearly define these groups, determine the conformability of their members, discover the bond which connects them together, and, above all, bring into UNITY the immense quantity of existing materials. By carrying out these principles, I wish to contribute something towards the solution of this problem; and whilst, in the manner named, I seek to point out how our knowledge of organic chemistry may assume a philosophical form, yet it is my particular endeavour to ascertain the precise point (and to impress its remembrance) where the unity may be perceived and thoroughly studied."

"As inorganic compounds are broken up into groups, the individual members of which are distinguished by a character in common, so it is also with organic compounds; but while the differences of chloric, bromic, and iodic acids—of potash, soda, and lithia, are due to the differences in the *qualities* of their elements, the differences of the characters of formic, acetic, and propylic acids—of wood spirit, alcohol, and fusel oil, depend upon differences in the *quantities* of their elements; and all new researches have led to the general result, that this increase of quantities follows a simple law, for a great number of organic compounds consist in a plus of

x C_2 H_2. When from ethyl C_4 H_5 is abstracted, the group C_2 H_2 there remains methyl, C_2 H_3, and therefore methyl — C_2 H_2 is = H. Now all radicals which belong to this class, as I have pointed out with reference to the radical of the methyl group, in all their combinations receive the character of hydrogen. The elementary character of this radical depends upon the hydrogen atom; it is that which determines the combinations of the whole group; in it lies the cause of the common chemical properties of its members; while x C_2 H_2 determines the different proportions and individual peculiarities of each. Therefore I denote H as the active part of this radical, and x C_2 H_2 as the component. In a similar way, the radical of the acid group, to which acetic and butyric acids, &c. belong, is split into the active part, C_2 H, and the component, x C_2 H_2. The chemical distinction between the radical of the methyl group and that of the individual members of the above-named acids, which I have mentioned as the radical of the formyl group, depends upon the chemical difference of the active part.

"As ethyl (C_4 H_5) is a member of series in which each successive compound is formed by the addition of C_2 H_2, so is benzid (C_{12} H_5). In its chemical relations benzid behaves itself as ethyl; it is therefore a necessary consequence to seek in the hydrogen atom the cause of the agreement of the common properties of the active part; thus hyduret of ethyl (C_4 H_5) H resembles hyduret of benzid (C_{12} H_5) H. Now, benzid C_{12} H_5 — ethyl C_4 H_5 is = C_8. When this remainder C_8 is denoted as the nucleus or kernel (*kern*), it enables us to consider benzid as consisting of the component, 2 C_2 H_2; the nucleus, C_8; and the active part, H. The formula of benzid is, therefore, 2 C_2 H_2, C_8, H; resembling ethyl, 2 C_2 H_3, H. As benzid is related to ethyl, benzoic acid to propylic acid, toluylic acid to butyric acid, and cuminic acid to capronic acid, so is

Propylic acid (2 C_2 H_2, C_2 H) O_3 + C_8 = Benzoic acid (2 C_2 H_2, C_8, C_2 H) O_3.
Butyric acid (3 C_2 H_3, C_2 H) O_3 + C_8 = Toluylic acid (3 C_2 H_2, C_8, C_2 H) O_3.
Capronic acid (5 C_2 H_2, C_2 H) O_3 + C_8 = Cuminic acid (5 C_2 H_2, C_8, C_2 H) O_3.

"These formulæ will at least be an assistance to the memory. How this nucleus C_8 occurs in the compound, or whether it exists at all, are questions not yet decided. But the fact is, that through the addition of C_2 C_4 C_6 C_8 to the radicals of the methyl and formyl groups, that of the hydropolycarbyle becomes formed."

Before giving an outline of Löwig's classification of organic compounds, we shall present to our readers his description of the various kinds of radicals upon which he has laid the foundation of his arrangement.

"The elements which exist in the organic compounds of plants and animals are, carbon, nitrogen, hydrogen, and oxygen. The last never appears as a constituent of organic radicals; it therefore follows, that only the first three elements can be, partly in single, partly in binary, and partly in ternary combination, as the elements of radicals which naturally form the bases of organic compounds. All radicals which are composed of these elements are on this account termed *primary*.

"Derived radicals are those which are artificially prepared, and which contain other elements besides the above-named; as when Ph H_3 is treated with chlorine, Ph Cl_3 and 3 H Cl are produced; and so, by the same treatment, the radical C_4 H_3 of acetic acid becomes C_4 Cl_3. This complex atom always behaves towards other elements as C_4 H_3. It combines with O_3, Cl_3 Br_3; when the combination (C_4 Cl_3) Cl_3 is treated with potash, there result 3 K Cl and (C_4 Cl_3) O_3. It consequently follows, that only the chlorine atom, which does not exist in the radical, is replaced by an equal atom of oxygen, and therefore we arrive at the determination that the chlorine is combined in different ways in this compound. The notion of a radical is not absolute, for in the compound (C_4 H_3) Cl_3, the radical is C_4 H_3, even as boron is in Bo O_3, and hydrogen in H Cl_3; on the contrary, in (C_4 Cl) O_3 is chlorine a constituent of the radical, which plays the same part as chlorine in chloric acid. These radicals can only be considered as derived ones, because they can only be produced by the decomposition of the primary radicals.

"As previously stated, organic radicals are as it were the elements of organic compounds. They can be considered as compound elements, with the same correctness as one speaks of compound atoms. They might be better denominated 'organic molecules,' under which name is understood a complex body of many

similar and dissimilar atoms, which in its combinations partakes of the character of a simple element; and this complex body, in the combinations which it forms, might be regarded as an indivisible whole. Organic molecules represent simple organic radicals; but when two or more simple molecules are associated, in the way that only one of them determines the capacity of combination of the compound molecule, then the others enter into combination also, but behave as indifferent bodies. The conjugated radicals are thus formed, in which are to be distinguished an active and a passive molecule; the active one determines the capacity of combination, and the passive one occupies no part therein and is termed the conjugate. Even organic compounds of a higher order partake of the character of conjugates; thus, the simple molecule methyl = $C_2 H_3$ combines with $S O_2$ to form $C_2 H_3$, $S O_2$, and this combines with $S O_3$ to form a conjugate acid = ($C_2 H_3$, $S O_2$) $S O_3$. When two simple organic radicals or molecules combine, in the way that each retains its capacity of combination, a double radical results. Thus the radical of succinic acid is a double radical = $C_6 H_3$, $C_2 H$; when this radical combines with oxygen, one obtains ($C_6 H_3$) O_3 ($C_2 H$) $O_3 = C_8 H_4 O_6$; in consequence, succinic acid saturates two atoms of bases, and is in effect a double acid."

"The term compound or organic radicals, which includes these divisions, applies only to those bodies which behave in their combinations entirely as elements. All the radicals, whether primary or derived, as well as their combinations, form equally a natural family."

In pursuance of the above-mentioned philosophical views and aims, Löwig arranges the primary radicals into four divisions, namely:—(1.) Carbyle (from *carbo* and ὕλη, matter) or radicals which consist alone of atoms of carbon, as oxatyl = C_2. (2.) Hydrocarbyle, which consist of hydrogen and carbon, as acetyl = $C_4 H_3$, ethyl = $C_4 H_5$, benzoyl = $C_{14} H_5$. (3.) Azocarbyle, which consist of carbon and nitrogen, as cyanogen = $N C_2$. (4.) Hydroazocarbyle, radicals which contain nitrogen, carbon, and hydrogen, as urea = $N C_2 H$. By this arrangement, the majority of organic compounds belong to the second of these divisions. Under the first division there are only a few radicals, and those only known in combination with oxygen, as for example:—

Oxalic acid, ...	$H O, C_2 H_3$.
Mesoxalic acid, ...	$H O, C_3 H_4$.
Melittic acid, ...	$H O, C_4 O_3$.
Croconic acid, ...	$H O, C_5 O_4$.
Rhodozonic acid, ...	$H O, C_7 O_7$.

He considers all those organic acids, derived from the radical oxatyl, and which are conjugates of oxalic acid and a hydro-carbon, such as malic, tartaric, citric, and meconic acids, as belonging to groups included in this class of primary radicals.

The second division, hydrocarbyle, is the most extensive and important of the four. The author divides the primary radicals contained in this division into two classes, namely,—hydroisocarbyle, and hydropolycarbyle. The first of these classes includes two groups—the methyl group, and the formyl group. The radical which forms the basis of alcohol, wood spirit, and fusel oil, he regards as = $C_2 H_3$, of which $C_2 H_2$ is the component and H the active part, because these bodies are either $C_2 H_2$ or multiples of them, plus H; and moreover the characteristic quality of each is due to the additional atom of hydrogen, because by the removal of $C_2 H_2$ from the higher members of this group, they are reduced to the lower ones, which still neutralize and

combine with sulphur, chlorine, and iodine. The radical of the formyl group is $C_4 H_3$, of which $C_2 H$ is the active part, and $C_2 H_2$ the component, for the same reasons as described with regard to the methyl group.

The second class, hydropolycarbyle, Löwig divides into five groups, which he terms the oleyl, the nicid, niceyl, benzid, and benzoyl groups. The radicals of each of these groups he considers consist of $C_2 H_2$, or a multiple of them, as the component; and $C_2 H$ as the active part, with what he terms a nucleus (*kern*) of C_2. This view of their constitution he exemplifies by the following formulæ of the members of the oleyl group.

1	Ferecryl, ...	1 $C_2 H_2$, C_2, $C_2 H = C_6 H_3$.
2	Unknown, ...	2 $C_2 H_2$, C_2, $C_2 H = C_8 H_5$.
3	Camphyl, ...	3 $C_2 H_2$, C_2, $C_2 H = C_{10} H_7$.
13	Moringyl, ...	13 $C_2 H_2$, C_2, $C_2 H = C_{30} H_{27}$.
16	Oleyl, ...	16 $C_2 H_2$, C_2, $C_2 H = C_{36} H_{33}$.
17	Döglyl, ...	17 $C_2 H_2$, C_2, $C_2 H = C_{38} H_{35}$.
20	Erucyl, ...	20 $C_2 H_2$, C_2, $C_2 H = C_{44} H_{41}$.

The azocarbyle only contains two known radicals: cyan, $= N C_2$, and mellan, $= N_4 C_6$. There are, however, probably two others, one of which forms the basis of parabanic acid, namely, paraban, $= N C_3$, and the other the basis of fulminic acid, namely, fulminin, $= N_2 C_4$.

The hydroazocarbyle possesses but one radical, uren, $= N C_2 H$, which is the basis of urea and its derivatives.

The organic bases Löwig arranges together under the term hydryle, because the prototype of these substances is ammonia, the hydrogen of which plays a curious and important part in its combinations. He divides the hydryle into six groups, namely: nitrogen, phosphorus, arsenic, antimony, bismuth, and platina bases.

Colouring matters, gums, starches, protein compounds, and bitter principles, which do not admit at present of a more rigid classification, Löwig includes under the general term, "compounds of a higher order."

We have, as far as our limits will permit, endeavoured, faintly we confess with regret, to give our readers an idea of the contents of this remarkable work, which we venture to predict will exercise a lasting influence in promoting a philosophical knowledge of organic chemistry. That which was in a state of repulsive disorder, Löwig has with a masterly hand reduced to a shape which admits of its being grasped as a whole and comprehended. If some of his views be not based on a solid foundation, still we must admire them and be thankful to the author, for battling with a "confusion worse confounded" which few chemists have the ability, and still fewer the courage to attempt, to bring into unison and harmony. We trust that this work will not escape the attention of the Council of the Cavendish Society, with a view to its translation, as we believe that its publication in an English garb would prove a great boon to the members of that Society, and tend considerably to a diffusion of more enlarged notions on organic chemistry.

FACTS AND DISCOVERIES IN SCIENCE.

Allotropism.—In the last number of the "Annals of Pharmacy, &c.," I drew the attention of your readers to Schrötter's amorphous or allotropic phosphorus, pointing out some of its differences, both physical and chemical, from phosphorus in its ordinary condition. Since that was written, Dr. Lyon Playfair has referred to this remarkable substance in one of his lectures, in which he states that common phosphorus is converted into amorphous or allotropic phosphorus, by heating it to a temperature of 460 or 480 degrees; but if heated a little above that temperature, it is reconverted into ordinary phosphorus. The following are the chief peculiarities of amorphous or allotropic phosphorus, in which it differs from common phosphorus. It is a good deal heavier than the latter. It is insoluble in bisulphuret of carbon, the latter being soluble in that substance. It does not ignite when brought into contact with iodine, whereas common phosphorus does. It is not luminous under a temperature of 500 degrees of Fahrenheit, whilst common phosphorus is luminous at comparatively low temperatures. In the manufacture of lucifer and Congreve matches—a trade now of considerable magnitude—the amorphous phosphorus requires to be mixed with oxide of lead, sulphuret of antimony, or chlorate of potash; for alone, that is unmixed, it does not ignite by friction.

Whilst speaking of *allotropism*, I may give another instance of this remarkable property in some bodies, in connection with one with which we are all quite familiar; this is coal-gas, the illuminating part of which consists, for the most part, of olefiant gas, which is *allotropic*, with solid paraffine, one of the peculiar products of the slow destructive distillation of common coal, in addition to naphtha, and oily hydro-carbonaceous compounds. With that precision of language which is demanded of us when referring to matters of science, we should not be quite correct in asserting that this substance, paraffine, although *allotropic* with olefiant-gas, is coal-gas in a solid form; yet it presents us with a very close approximation to what has been hazarded as a conjecture, or hypothesis, by Liebig and other eminent chemists,—that amongst the surprising discoveries of advancing chemical science, would be those of the conversion of hydrogen gas and coal-gas into the solid state.

Medicated Cigars are likely to become an article of manufacture and trade by the chemist and druggist, if the efficacy attributed to them by some medical authorities should successfully stand the test of experiment in various and numerous cases of disease. The employment of a variety of organic and inorganic substances, capable of volatilization, has occasionally been resorted to in the form of cigars.

The bichloride of mercury, dissolved in alcohol or ether, iodide of potassium in solution, tincture of iodine, an ethereal or alcoholic solution of the active principles of hyoscyamus niger, of conium maculatum, and of datura stramonium, have been employed for the purpose of medicating cigars, by soaking or moistening the tobacco leaves, deprived of their nicotine. Arsenical cigars, prepared by macerating tobacco in a given quantity of the liquor arsenicalis, or Fowler's

solution of arsenic, have been made use of, and cigars medicated with a solution of creosote in alcohol or ether have been much recommended, and found useful as a remedy in severe toothache.

Chromic Acid.—Dr. Heller, a German physician, recommends the employment of chromic acid as an escharotic in many severe cases, under proper and judicious medical supervision. According to his experiments, all organic compounds are soluble in the easily deoxidizable chromic acid, their ultimate elements being raised to a higher degree of oxidation, and partly uniting with the acid. Smaller animals, such as mice, birds, &c., were so completely dissolved by chromic acid within fifteen or twenty minutes, that no trace of their bones, skin, hair, claws, or teeth could be discovered. From his experiments, it would appear that chromic acid is not only a safe and gradual escharotic, but also a rapid and complete solvent of organic animal matter.

Mercerized Cotton.—Many of your readers will doubtless remember that in the late Great Exhibition, a number of very beautiful cotton fabrics were exhibited to the public, as the product of a certain chemical process, known as that of Mr. Mercer. This process, which has now obtained the name of Mercerization, consists, in fact, of the chemical union of cotton with the alkalies, either soda or potass, although, in strict propriety of language, this term should imply the union of the former of these alkalies with cotton; for in the original Mercer's process soda was the alkali made use of. Mr. Mercer, by a series of beautiful and interesting experiments, demonstrated that when cotton itself, or any cotton material, was thoroughly soaked in a strong solution of caustic soda, a combination of the cotton and the soda takes place, the cotton becomes considerably contracted in bulk, and is much more susceptible of various dyes; it is, in fact, *Mercerized*. The fibres of the cotton, when thus acted upon by the caustic soda, shrink to such a degree as to assume an appearance of extraordinary fineness, retaining this contraction in size even after the caustic soda is removed by the immersion of the material in water.

New Species of Cochineal.—A French naturalist, M. Guérin-Meneville, has communicated to the Academy of Sciences in Paris an interesting account of a new species of cochineal, indigenous to France, subsisting on the marsh bean, *Vicia falea*, and abounding so much in a rich colouring matter, as to render it highly probable that it may be made use of in the industrial arts. In his description of this insect he says, that when bruised between a fold or folds of linen, or paper, as the foreign or South American cochineal is tried, it furnishes a rich red colour, which induces him to think that it may possibly contain so much colouring matter, as to bear a successful comparison with that now in general use. The fact that it would be very practicable to cultivate, and so procure regular crops of this insect, renders its discovery of considerable value and importance. He says it is so abundant on the *Vicia falea*, that in a few hours he was able to collect a great quantity of this indigenous cochineal, simply by brushing the plants on which these insects were observed by him. After he had collected them, he pursued the directions given for the preparation of the cochineal of commerce, namely, killing them by means of boiling water and then drying

them in the sun. He thus procured, as a specimen or sample, an article which bears considerable analogy to the ordinary cochineal, and which he hopes will be directed to be experimented upon, so as to ascertain its value as a colouring matter, to be hereafter used in the art of dyeing. He brought a number of these insects with him from the country to Paris, so that he might continue to observe their habits, and he has seen that myriads of eggs, which they laid in the autumn, were hatched during the winter; and he states, that the young ones are capable of existing without any kind of vegetable nourishment, until they can procure the peculiar plant on which they delight to live. The precise locality whence these cochineals are brought is not stated, but in general terms it is stated to be from the south of France.

Tartaric Acid employed for promoting the Solution of Sulphate of Quinine.—It is stated in one of the medical journals, the "Dublin Medical Press," that Messrs. Bouchardot, Righini, and Ruspini recommend tartaric acid to be used for the purpose of facilitating the solution of the sulphate of quinine, instead of sulphuric acid; and M. Casorati has observed that one grain of tartaric acid is sufficient to saturate three grains of disulphate of quinine, the compound being then a sulphotartrate of quinine, and not at all unpleasant to the taste. A few drops of diluted sulphuric acid will, as is already well known, greatly promote the solution of disulphate of quinine; but the taste of the resulting solution is then very bitter and disagreeable.

Balsam of Copaiba.—In one of the foreign journals devoted to chemistry and pharmacy, M. Guibourt has given instructions for testing the purity of balsam of copaiba. If four parts of sulphuric acid be added to thirty parts of balsam of copaiba, and then well triturated together in a mortar, a solid mass is produced, provided the balsam be pure and unadulterated; whereas, if it should have been adulterated with castor oil, as it is said it very frequently is, this solidification does not take place. This mixture of balsam of copaiba with sulphuric acid constitutes a good solid mass, by means of which this nauseous medicine may be administered in the form of pills, covered with starch or sugar, or any other vehicle, so as to suit the sight or taste of the patient.

The Nauseous Taste of Medicines prevented.—Dr. Polli, an Italian physician has remarked that some aromatic substances, as orange or lemon peel, chewed just before taking castor oil, effectually prevent its being tasted. On this subject he states, that the mouth should be prepared beforehand, so that the nauseous taste of some medicines may not be perceived, and that this answers the purpose better than chewing or swallowing aromatic substances, condiments, &c., before taking these medicines.

New Test for Nitrates.—Mr. Schaeffer's process consists in adding to a solution suspected to contain a nitrate one or two drops of the solution of yellow prussiate of potash, not enough to give the least perceptible colour to the liquid to be tested. A further addition of a few drops of acetic acid is then to be made to the suspected liquid, and immediately, or in a few minutes, the liquid acquires a yellow tint, according to the quantity of the soluble nitrate present in it. C.

THE COMPOUNDS OF IODINE WITH QUININE AND MORPHINE.

BY F. W. WINCKLER.

Iodide of Quinine.—When iodide of potassium and sulphate of quinine are dissolved in boiling water, in equivalent proportions, regular crystals (free from iodine) of sulphate of quinine are formed. A similar result is obtained when, instead of sulphate of quinine any other salt of quinine formed with an oxy-acid is used. The hydro-acids give a contrary result. A mixture of hydrochlorate of quinine and iodide of potassium, in equivalent proportions, precipitates a small quantity of iodide of quinine in a resinous state. To the complete decomposition of the hydrochlorate of quinine, Winckler has found that four equivalents of iodide of potassium are necessary. The compound then produced consists of two equivalents of quinine, with one equivalent of iodine, or 126 parts of iodine and 328 parts of quinine. This combination has, when dried, the properties of a resin. When cold, after being thoroughly dried, it is easily powdered without being electric, as the pure quinine is when rubbed. It is white, without smell, permanent in the air, and possesses a very bitter taste. It dissolves considerably in water, almost in any quantity of spirit, and also in ether. All these solutions are clear, colourless, and leave behind, when evaporated, the iodide of quinine in the form of a transparent resin. By chlorine, concentrated sulphuric and nitric acids, this salt is immediately decomposed, with the separation of its iodine. Its combustion on platina foil is with difficulty effected, and the residuum, after combustion, contains no trace of potash. The analysis of this salt gave—

	Found.	Calculated.
Quinine,	71,58	72,166
Iodine,	28,42	27,834
	100,00	100,000

Iodide of Morphine.—This salt consists of one equivalent of morphine and one of iodine. It is to be obtained by dissolving 120 parts by weight of dry acetate of morphine in 960 parts of cold distilled water, and filtering the solution. Add previously to filtration a few drops of acetic acid, if any of the morphine remains undissolved. Decompose the filtered solution with a solution containing sixty parts of iodide of potassium. The iodide of morphine crystallizes out of this liquid after some time in very fine crystals, and may be obtained in still finer crystals if the mixed solutions are warmed in a water-bath, and then slowly cooled. It thus separates in transparent, shining, colourless, four-sided prisms, which cannot be distinguished by their appearance from sulphate of quinine. Iodide of morphine dissolves slightly in cold water, but readily in hot water, and easily in alcohol. Its solutions have a bitter taste. The analysis of this salt gave—

	Found.	Calculated.
Morphine,	71,4	71,24
Iodine,	28,6	28,76
	100,0	100,00

——*Jahrbuch für Prakt. Pharm.*

ON DRY ALCOHOLIC EXTRACTS.

BY GUILLERMOND.

The method by which we prepare these extracts, consists in evaporating, by a moderate heat, the alcoholic tinctures of vegetable substances, and in the admixture with the extract thus obtained of a certain quantity of gum arabic. The extracts prepared by this method are easily kept in a good condition. The alcoholic tinctures employed for this purpose are prepared either by macerating the fresh plant with alcohol, or by mixing the expressed juice of plants with alcohol. In general, the affinity of the alcohol for the active principles of plants is very great, for it dissolves them unchanged.

These alcoholic preparations represent, in the truest manner, the pharmacological properties of plants, particularly of those the active principles of which are unknown, or are very readily decomposable. Their application is somewhat inconvenient; for the alcohol contained in them, which extracts their active principles, is often an objection to their administration; and it is on this account that the ordinary extracts are used, the applications of which are numerous. For internal use, these extracts can be best prepared, according to my idea, in the following manner:—When a tincture has been prepared from the fresh juice of a plant, an experiment should be made, to ascertain the quantity of dry extract which it contains (generally, these tinctures contain four per cent. of solid matter); then gum arabic is added, in such a quantity that the extract shall contain three times its weight of gum; that is to say, whether the tincture contains more or less solid matter, the extract must always consist of this proportion of gum.

Before adding the gum to the tincture, it is advisable to drive off the alcohol by a gentle heat, as the gum will not dissolve until this operation has been effected. When the gum has been added, the mixture should be constantly stirred until the extract has become of a proper consistence. The quantity of extract mixed with gum is somewhat important, because dried plants, as a general rule, yield one-fourth of their weight of extract; therefore, the product should follow that simple rule as far as possible, by rendering one part of the extract prepared as above described equal to one part of the dried plant, or one part of the simple extract equal to four parts of the mixture of gum and extract.

Extracts thus prepared retain all their properties so well defined, that they can be readily distinguished from one and another, which is not the case with those made in the ordinary way.——*Journal de Pharmacie.*

LECTURES ON BOTANY FOR PHARMACEUTISTS.

We are induced to call attention to these lectures, delivered by Professor Bentley three times a-week, in the Botanical Gardens, Regent's Park, not only for the instruction they afford, but because the attendance upon them involves a healthful exercise of the body as well as of the mind, in these delightful gardens. Members and Associates of the Pharmaceutical Society, enjoy the privilege of free admission, and non-members may acquire the same privilege upon payment of one guinea, by application to the secretary of the Pharmaceutical Society.

ON THE COMBINATION OF ARSENIOUS ACID AND ALBUMEN.

To the Editors of the "Annals of Pharmacy and Practical Chemistry."

GENTLEMEN,

I regret that other and more important professional duties will prevent Mr. Herapath from communicating his results upon "the vexed albumen and arsenious acid controversy" for a few weeks. I am most anxious to learn his results, now that he finds his poisonous compound administered to the poor cat was an alkaline arsenite.

Mr. Herapath writes,—"but it still remains to be proved that any arsenite of potassa or soda is formed when arsenious acid is boiled with white of egg." If Mr. Herapath will take nothing for granted, even when a chemist in my position tells him a fact—arsenite of potassa is formed, and the albumen is soluble in it,—we may go on quibbling till doomsday. I have repeated my experiments, with pure albumen and arsenious acid, and I am more, and more, convinced of their truth. To enter more into the details at present I cannot, as my whole time is occupied with many important investigations for other parties. I should never have answered Mr. J. B. Edwards' communication on arsenious acid and albumen, if I did not know that there are parties to be found, upon whom even such productions as his might exercise some influence, if permitted to pass into the world undisputed. This was my *sole* reason for ever bringing his name prominently before the public. There are a host of adherents to my way of thinking; among them I can name Dumas, Gregory, Anderson, Kane, and others, one of whom wrote,—"With respect to the action of the salts of mercury, lead, and arsenious acid on animal matters, I satisfied myself years ago; I found them all capable of rendering albumen *insoluble*, and also of *forming chemical compounds* with it." Who are those opposed to me? Mr. Herapath, of Bristol, is the only one of any note. I am sorry that his results are slightly at variance with mine. Let us, however, see what experiments he will next bring forward.

My decided belief is, that they will enlist him on my side? The reason of my thinking so is on account of the following passage in his last letter to you:—"* * * it is my intention to repeat my experiments on this point, *with such precautions*, as will preclude all possibility of error from *the presence of an alkaline arsenite*." Why should Mr. Herapath make arsenious acid the only exception to not forming a compound with albumen? If all other acids and salts combine with albumen, we might surely infer, without any experimental proof, that there was an arsenite of albumen as well as a sulphate.

The investigation is a difficult one, and, if I mistake not, it will take better chemists *than any named in this letter* to prove that arsenious acid and albumen *do not combine*. I am quite willing that Mr. Herapath should judge "of my talents from common repute and my published productions." The latter are too numerous to mention here. He will, however, find extracts from them in every leading scientific work in Europe; and it is with pride I repeat that *not one of my analyses* has ever been refuted, a fact which must have been known to Dr. Hermann Hofmann, when he wrote me—"* * * and as regards *physiological chemistry*, the most difficult of all, I should like you to pursue it, on account of *your very great skill as an analyst*."

One more remark, and I have done. Mr. Herapath writes,—"The mistake that has been made by your correspondent, in identifying me with Professor Herapath, the well known toxicologist, has been doubtless already perceived by you." What mistake did I make? I have known from the commencement of this controversy that there are two Herapaths,—Dr. Herapath, the toxicologist (father), and Mr. Thornton J. Herapath (son).

Yours respectfully,

SHERIDAN MUSPRATT, F.R.S.E., M.R.I.A.
Membre de la Société d'Encouragement, &c. &c.

COLLEGE OF CHEMISTRY, LIVERPOOL,
May 8th, 1852.

PATENT MEDICINE LICENCE.

To the Editors of the "Annals of Pharmacy and Practical Chemistry."

GENTLEMEN,

The exorbitant impost—and in the case of small druggists, quite a preposterous one—of £.2 a-year for a licence to vend perhaps £.5 or £.6 worth of commodities called "patent" medicines, not the most creditable part of a druggist's stock, and certainly not the most profitable, has been very generally complained of by chemists in and round London.

The chemist is placed under a sort of necessity to sell these medicines, because others in the trade sell them, though, take the year through, he is out of pocket by doing so. The licence in fact will cost him as much as a fire insurance upon £.600 or £.700 worth of goods and chattels. Perhaps many who incur this outlay are even uninsured against fire!

In another respect the chemist requires the licence. Many of his own formulæ he desires to put up in a neat and saleable form; but still, if he dare to mention the bare name of any disease to which any one might be applied, down comes the informer upon him in an instant. It certainly does appear that the proceedings of Government agents among the chemists have, in some cases, been marked by a meanness and minuteness that borders upon absolute persecution. And what has the exchequer been the richer for these paltry proceedings? So far as the Stamp Office is concerned, not one farthing. There is not a vender of a nostrum worth twopence who does not, with all the bounce of a hero, fly to the "white letters upon a red ground." In fact, so well is quackery protected, that the most costly patent for the most magnificent invention has no security at all equal to it. Nor is it likely that a chemist would not avail himself of such a security, if his sale for any article were sufficient to pay the outlay of the required number of stamps (£.50), which of course is not money sunk. In short, the security afforded by the Government to the quack proprietor, while it is *bonâ fide* and absolute, costs him actually not a farthing. So also, in case of infringement, there must be forgery, or, according to the rigmarole, "felony of the deepest die;" and of course Government would be the prosecutor and bear the expense. But to return to the licence, the cost of which is £.2 a-year for Town and twenty miles round. In corporate towns beyond that limit, it is only 10*s.*; and in non-corporate towns, only 5*s.* a-year.

The remedy that appears to suggest itself is this:—Place an equal tax (licence) upon all retail venders (whether in town or country) of, say 15*s.* a year; then, if there should be a deficit in the tax (which from the increased number who would have a licence, is much to be doubted), such deficiency might easily, and with justice, be made up by an increased licence upon wholesale dealers, and most especially upon the nostrum proprietors themselves.

There is one very probable result that would follow such a remission of the patent medicine tax upon the retailers, *viz.*, an increased number of subscribers to the Pharmaceutical Society. This would be all the more likely to happen if the Society were to become instrumental in the change; and still more likely if the terms of subscription could be somewhat reduced.

There is also another privilege to ask; one, which while it would be quite a boon to the chemists, would not cost the Government much. It is simply this: to allow chemists to put whatever they please on their *labels*, providing such liberty did not extend beyond fifty (?) words. This, while it would allow a short mention of the properties of a medicine, would not suit the purposes of the quack at all. In fact I do not fancy the Government would lose £.50 a-year by it. What would be the good of fifty words to relate a most "miraculous cure?"

I remain, GENTLEMEN,

Your obedient Servant,

WM. GALLARD.

30, LISSON GROVE, *May* 1852.

TO CORRESPONDENTS.

Inquirer.—Combinations of a portion of the Council, with one of its servants, determine the elections. These combinations would be rendered nugatory were the members to do their duty, by attending in sufficient numbers; therefore, as long as the members are supine, and a majority of the Council delinquent enough to form such combinations, the power of election will remain in their hands. Had you been a noodle or a toady, your election would have been certain.

H. C.—The quantity of sulphuric acid required for one pound of ivory black is about one ounce.

Mr. Henry Martin, Wigton.—1. Fownes' "Manual of Chemistry." 2. "Instructions in Chemical Analysis," by C. R. Fresenius.

H. Rice.—Hubert's Roseate Powder, for removing superfluous hair, is nothing but common quick lime. It is frequently spoiled by the absorption of carbonic acid from the atmosphere, which is the case with the specimen sent by our correspondent.

W. D. F.—1. Reinsch's test is described in most recent works on chemistry. 2. Marsh's apparatus costs about eight shillings. 3. It is not a fact.

Amator Scientiæ, Kingstown.—Lehmann's "Physiological Chemistry" can only be obtained by your becoming a member of the Cavendish Society.

G. Cort, Winslow.—1. Caoutchoucin, a volatile liquid prepared by the destructive distillation of India rubber, is the best solvent for the purpose mentioned 2. It is not possible to destroy the smell.

C. H. R.—For light blue, sulphate of copper dissolved in water. For dark blue, sulphate of copper and water, with sufficient liquor ammonia to precipitate the oxide of copper and re-dissolve it. For red, an infusion of cochineal with ammonia. For pink, muriate of cobalt and water, treated with carbonate of ammonia as for dark blue. For green, sulphate of nickel and water. For yellow, chromate of potash and water. The proportion of water to the ingredients must be determined by the required intensity of the colour. Most of them must be filtered, to render the colours bright.

Walton.—Royle's "Materia Medica" is an excellent work; the same remark applies to Parnell's "Analysis." The other work mentioned is superfluous if you have the above. Red ink; make an infusion of cochineal, and add a little ammonia to brighten it.

E. H. T.—By whatever process glycerine is made it possesses the same qualities, being a definite chemical compound. An impure article should not be employed for any medicinal purpose.

Fair Play.—We have received a letter under this signature for publication, reflecting upon the impropriety of a number of strangers being present at the Annual Meeting of the Pharmaceutical Society; and also upon the evil results likely to arise from allowing anybody to have access to the ballotting papers which lie on the table. We should have published the letter had it not contained some comments on the conduct of the president, and had it been signed with proper name and address.

M. P. S.—Lapis Divinum is prepared as follows:—Take of verdigris, nitrate of potash, and alum, each sixteen parts. Rub them together, and liquify them by the heat of a sand bath, in a glass vessel. When these ingredients are in a liquid state, add one part of camphor, and mix.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG,

Professor of Chemistry at the University of Giessen.

No. VI.

Operations which involve Mixing and Separation of the first degree.

Solid bodies become frequently, through heat, fluid, and sometimes volatile. By these means all separation and mixing of the first and second degrees are effected. The solving power of menstrua is increased by heat. When a body is perfectly soluble in a fluid, the solving is termed total; and when only a portion of substance is soluble, it is termed partial.

The total solving is mostly a very simple process. When bodies are fluid, this is accomplished by shaking them together. When several fluids are to be mixed, the smallest quantities should be mixed first, and then the larger ones added. Many liquids, such as alcohol, or vitriol and water, evolve heat when mixed; consequently the former should be added carefully to the latter. Solid bodies ought to be pulverized, except those which are easily soluble, such as sugar, and some salts, before being added to the menstruum. Solution is facilitated by heat, and by shaking or stirring. When pure substances are used, the resulting solutions must be clear; and when foreign substances are present in an insoluble form, they should be removed by the filtration or straining of the solution. The solution of salts and alkalies in water requires no particular manipulation. It is only necessary to observe that the vessel employed shall not communicate any contamination by the action of its contents. On the small scale, vessels of earthenware, porcelain, glass, or serpentine, are employed; on the large scale, vessels of stoneware, tin, tinned copper, or tinned iron. Alkalies should be dissolved in iron vessels, because they act on tin and other metals. According to the greater or lesser solubility of salts, by the aid of heat or cold, must the use of these agents be determined.

Deliquesence involves solution, for it consists of the property which many solid bodies possess—of abstracting moisture from the air, in

which moisture they become dissolved. To accomplish this, it was formerly the custom to place these substances in a damp cellar until they had absorbed sufficient water to dissolve them. They were called oils, as, for example, oil of tartar. Many salts, which contain much water of crystallization, become fluid when gently heated, which is one form of solution.

Mucilage is a thick, somewhat tenacious, watery solution of gum. Frequently it is prepared by rubbing powdered gum, with water gradually added, until the gum is dissolved. In the first instance, sufficient, but not too much water must be added to prevent the formation of lumps, or the formation of mucilage will not be perfectly effected by trituration. Gum, according to its description, requires different quantities of water to form a thick mucilage; for example, gum arabic requires three-parts, and tragacanth forty-eight parts of water, to form a fluid of equal consistence. The best course for the physician to pursue is to order the quantities of gum and water to be mixed, because the thickness of the mucilage required is often different.

Emulsions are not pure solutions, but partly intimate mixtures of oils and resins with mucilagenous or albuminous liquids, by which a turbid fluid is produced. They are prepared in various ways. Generally, equal parts of powdered gum and oil, or one of the former and two of the latter, are rubbed with a little water until the oily particles disappear; then the remainder of the water is gradually added with constant trituration, or sometimes the gum is formed into a thick mucilage with water, and the oil gradually rubbed in until it has disappeared, when the remainder of the water is, by degrees, added. To one part of oil, twelve parts of water are usually used. In the same manner are resins and balsams, with gum, sugar, and yolk of egg, made into emulsions. There are some gum resins, as ammoniacum galbanum and assafœtida, which produce, with water alone, emulsions when rubbed with it by the method described. The preparation of emulsion of almonds is a case of partial solution. The almonds are beaten with a little water into a thick paste, and then the rest of the water added in small portions at a time, until the milk is formed, which is to be strained. One part of almonds is necessary for twelve parts of water. Other oily seeds may in similar way be formed into emulsions. When a little gum arabic is added to the milk of almonds, it is called emulsio arabica sine oleo.

Syrups are watery solutions of sugar, of a thick consistence. Their preparation is very simple. Sugar, with half its weight of the juice of some fruit or watery extract, is gently heated until dissolved, and the mixture boiled for a few minutes and strained. Some syrups, as that of violets, must not be boiled, or they will be injured. With the exception of syrup of almonds, they must be clear. Syrup of almonds is prepared by beating in a mortar well dried blanched almonds, with half the weight (above described) of sugar, until a homogeneous mass is produced, then adding by degrees two-thirds of the quantity of water used for making ordinary syrups. The whole is then strained, and the residuum washed with the remaining third of water. To the resulting liquids is added the other half of the sugar, and the whole submitted

to gentle heat, until the sugar is dissolved: this syrup throws nothing down. Syrups should be of a proper consistence, which is best determined by the hydrometer. They should not, when dropped hot on a cold plate, skin over; nor, from their disposition, flow but slowly away.

Mellita, or honeys, resemble syrup very much. Raw honey is purified by boiling it with water, removing the scum, and straining. A better process to purify honey is to dissolve it in two or three times its weight of water, and put the solution into a high pot, which has an opening from one to two inches from the bottom, which can be closed, for two or three days in a cool place; when the clear liquid is run out at the side opening, the thick residue is placed on a strainer to separate the remaining clear portion of the honey, both of which are then mixed and evaporated to the consistence of honey, in a water bath. Honey thus purified retains all its natural colour, sweetness, and flavour, which is not the case when purified by the ordinary methods.

Spirituous solutions are called either spirits or tinctures, and consist of either solid or liquid substances, dissolved in alcohol, more or less diluted. They are generally prepared in closed glass vessels. When made from solid bodies, these are first reduced to a state of minute division, and then macerated with frequent agitation in the spirituous liquid, until it has extracted their virtue, when the clear portion is removed by filtration.

Mixtures are either solutions of solid substances, or mixtures of fluid ones, or both, and frequently contain finely-divided particles of insoluble substances, and sometimes partake of all these characters. They are seldom officinal preparations, being prepared generally from the magistral formulæ of the physician. Liquors are sometimes alcoholic or ethereal solutions, but generally watery solutions of saline bodies, of a clear and seldom coloured nature. Fatty solutions, and resinous compounds with fats, are sometimes fluid; for example, camphor oil, which is prepared by triturating camphor with oil until it dissolves. Heat may be applied with advantage in this operation.

Salves are compounds of fat oils, with solid fats, wax, and resins, and often contain other solid bodies in a pulverent form. They should possess the consistence of lard.

Plaisters are distinguished from salves by having a more solid and hard consistence, and by being of a more adhesive nature. They become soft by being gently heated, without becoming quite fluid, and are then very adhesive.

Partial solution has for its object not only mixing, but also separation. When a solid is partially dissolved in a fluid, and the dissolved portion thrown away as useless, and the insoluble portion retained, the operation is called edulcoration. When the portion dissolved in the fluid is retained, and the insoluble part rejected as valueless, it is called elixivation; or when, from a seeming homogeneous body, some portion is dissolved out by a menstruum, it is called extraction—a process generally applied to organic bodies, to remove their active principles. According to the way in which extraction is accomplished, it receives its name.

Maceration is that description of extraction which takes place when

a body is left for some time in contact with a menstruum, without the application of heat for the purpose of dissolving out its soluble portions. The products are cold infusions, and are called either spirituous, or vinous, or watery, after the vehicle used.

Digestion is a kind of extraction, which is brought about by the aid of a gentle heat, that is, from 80° to 100° Fahr. Most tinctures, medicated wines, essences, and medicated vinegars were formerly prepared in this way, but are now made by maceration. Tinctures should be clear fluids, and have the smell and taste strongly of the substances from which they are prepared. The proportion of the menstruum employed should be, in general, about six times as much as the solid substances to be extracted. The same remarks apply to medicated wines and vinegars. When the menstruum is poured boiling hot on the substance to be extracted, and allowed to remain until it is cold, the operation is called hot infusion, which is very suitable for many substances; however, there are others, such as herbs, which contain essential oils, where it is detrimental, as these oils are driven off in the process. The best remedy for this evil is to conduct the operation in vessels which admit of being closed air-tight. The products are called decoctions, when the menstruum is boiled for a long time with the body to be extracted. This process is applicable to substances such as roots, barks, and woods, which possess a tough, hard texture, when it is difficult for the fluid to penetrate them readily. and when their active principles are not volatile by a boiling heat, Decoctions should be made in tinned copper or silver vessels. When substances contain anything which would act upon these metals, it is imperative that glass or porcelain should be employed for this purpose. It is a bad plan to direct that the reduction from a larger quantity to a smaller one shall determine the time during which the boiling is to take place, as the fluid must evaporate according to the strength of the heat to which it is exposed; consequently, by this test, the decoction will boil three times as long in some cases as in others. Far better it is to boil decoctions for a specified time, depending upon the nature of the materials to be extracted, and taking care to adjust the quantity of the product by a subsequent addition of the menstruum if necessary.

Infused and boiled oils are prepared in a similar way. Either dried vegetable substances are digested for a time with a fat oil, or fresh ones are boiled with the oil until their moisture is expelled, and then the oil is pressed out. Care must be taken to ascertain when the moisture is expelled; because, if this be not done, the oil, which possesses very little capacity for latent heat, soon becomes very hot, and when the moisture is volatilized, becomes empyreumatic. The best method to prevent this result, is to conduct the operation in a chloride of calcium bath.

In recent times the method of extracting organic substances has been very much improved. For hot extraction the water-bath is very much to be recommended, in which a box, with a well-closed cover, containing the substance to be extracted and the menstruum is placed. By constant agitation of this box the operation is quickly performed. The

water in the bath must be kept at a boiling heat, but it is not necessary that it should be kept constantly full, as the steam arising therefrom keeps up the temperature of the contents of the box as readily as the water. The only precaution to be observed is, to take care that the water does not entirely evaporate from the boiler.

Also by high-pressure steam alone is the process of hot extraction performed. This steam is conducted from a closed boiler, through tubes, into the vessel wherein the substance to be extracted is placed with water. The steam, by passing into the liquid form, evolves so much heat that the water is speedily heated to the boiling point, by which means extraction is rapidly and completely effected.

Extraction has for its object, as a rule, the separation of active from inactive principles. The extracted portion ought to be of the same quality in the extract as it is in the substance from which it is obtained. The application of heat for extraction has for its aim a complete exhaustion of the substance to be extracted, by the softening of its fibres, &c. Sometimes the extracted constituents are themselves changed, as well as their medical properties, by heat. To obtain these in the greatest degree unchanged, cold extraction is the most suitable means. Alone, maceration produces very incomplete extraction, and besides employing much time with the necessary quantity of fluid, the watery extract is frequently spoiled. It consequently follows that those substances should alone be extracted in this manner which require a limited time for the completion of the process, if a good extract be desired. The best means to facilitate the progress of this operation are the Real and Romershausen presses. In the first, this object is accomplished by the pressure of a high column of fluid acting on the substance to be extracted, which should be in a finely divided condition, and pressed into a cylinder of much larger diameter than the column of fluid. This cylinder should possess a small aperture at the bottom to allow the fluid to escape, and be collected as it filters through the substance to be extracted. Care must be taken to keep the column of pressure constantly full with fluid, which is generally the same liquid as that which is used as the menstruum for extraction. The second is very similar in its character, except that atmospheric air is the agent employed for pressure, by means of a vacuum pump.

ON THE COMBINATION OF ARSENIOUS ACID AND ALBUMEN.

BY DR. SHERIDAN MUSPRATT, F.R.S.E., M.R.I.A., ETC.

Professor of the College of Chemistry, Liverpool.

In your last Journal I find a new series of experiments on this subject, "with the view of confirming or disproving" Mr. Herapath's "former results;" and further he adds:—"As I now wish to conclude this controversy, I have thought it advisable to include in it the experiments I have already made public, whose accuracy a repetition has enabled me, I hope, to place beyond dispute."

I do not see that my position or experiments are at all altered by Mr. Herapath; if I did, I should willingly acknowledge it; for I am convinced that there is more honour resulting from a candid avowal of error, than from an attempt to sustain, by bold assertion or special pleading, the false, or even the doubtful.

The first person who stated that arsenious acid combines with albumen, was Professor Liebig. His *assertion*, if Mr. Herapath wishes me to call it so, was backed by Kane, Gregory, Anderson, Graham, and a host of others of lesser note. Further, I performed some experiments on the subject, and the results confirmed the statements made by Liebig.

I will not chain my thoughts to any man's hypothesis, not to save myself from anger and vituperation. Truth is truth, and will ever prevail. So let it be with the vexed question of arsenious acid and albumen. As this is the last paper you will receive from me on the subject—no matter what follows it—I will again review the whole matter, and incorporate any new proofs that I have since obtained with regard to the theory of the action of mineral poisons.

I shall propose to myself certain queries, and answer them successfully, I trust, in the annexed pages.

Does arsenious acid precipitate albumen from its solutions in the cold?

Why this question should have been proposed by Mr. Herapath, I know not; for even if it did not precipitate albumen, surely this is no proof of non-combination? Sulphurous acid dissolves alumina, and does not precipitate it in the cold, although, when heated, precipitation and *firm combination* occurs. Mr. Herapath gives the following in his first experiment:—The transparency of the albuminous solution was not *in the slightest degree affected by the presence of arsenious acid.* I do not know whether my learned opponent is short-sighted; but when I tried the experiment, even under a temperature of 98° Fahr., considerable opaqueness occurred.

Can these two bodies be induced to combine by the agency of heat?

"499 grains of the glairy albumen of eggs were taken, and intimately mixed, by long-continued trituration, with 3 grains of arsenious acid; the latter having been previously dissolved in a quantity of water sufficient to effect a perfect solution. The mixture was then coagulated by heat, and afterwards carefully evaporated to dryness in a water bath. The yellowish residue thus obtained was reduced to very fine powder in a mortar, and repeatedly digested for several hours together in boiling water; care being taken to reduce the compound to a still more minute state of division, by patient trituration in a mortar, after each digestion, &c. The washings (even those portions which first passed through the filter; *i.e.* before the pulverization of the compound was commenced), on being treated by Reinsch's process, were found to contain a large proportion of arsenious acid. The insoluble residue having been digested in water for about twelve or fifteen hours, as before described, was dried and weighed; it amounted to 29 grains. It was then boiled in strong hydrochloric acid, when it dissolved with the characteristic colour of the proteine compounds. Upon testing this solution in the usual manner, only *exceedingly minute traces of arsenic could be detected.*"

No matter what washing Mr. Herapath had recourse to, collaterally

with smashing, and other queer manœuvres, in mortars and beaker-glasses, he could not eliminate *minute traces of arsenic*, which were—I assert—*combined* with the albumen. Sulphite of alumina, when boiled with water, yields sulphurous acid; and even when this salt is edulcorated for days with hot water, traces of the sulphurous acid are to be found in the filtrates. Because arsenious acid can be to a great extent extracted from albumen by hot water, that is no proof whatever that combination has not taken place; and I believe every *chemist* but Herapath will agree with me in this.

I took 0·1 grain of dissolved arsenious acid, and 12·5 grains of the glairy albumen of egg; they were intimately triturated together in a mortar for about twenty minutes, coagulated by heat, and evaporated to dryness in a water-bath. The residue, affused with cold distilled water, and filtered, yielded a filtrate which gave for a short time slight deposits of arsenic on copper, by Reinsch's test. After several washings, no arsenic could be detected by sulphide of hydrogen—proving a combination to have taken place. To ascertain whether any of the arsenious acid was mechanically combined, I boiled a portion of the desiccated residue with water, and filtered: the filtrate contained arsenious acid. I washed the mass with boiling water for six days; *many gallons* of water had passed through the mixture; still, when the residue on the filter was heated with pure sulphuric acid, and then submitted to the preceding experiments, arsenical indications were immediately obtained; satisfying me that there was also *a chemical combination*. Mr. Herapath, in the February number of your Journal, page 62, has the following:—"The presence of minute traces of arsenious acid in the residuary matter, upon which so much stress has been laid, may be readily accounted for. It is unnecessary to point out to a chemist of Dr. Muspratt's experience, the almost impossibility of removing the last traces of a foreign body, even from a simple inorganic precipitate—alumina or sulphate of baryta, for instance; and of course this remark is still more applicable to an albuminous coagulum, where the contaminating ingredient is enveloped (so to speak) in an almost impenetrable covering."

I can readily wash *any foreign body* from sulphate of baryta, or alumina, in an hour, or less; but neither Mr. Herapath nor myself can rid the albuminous compound of minute traces of arsenic, *even in weeks*.

Will Mr. Herapath inform me what numbers will correspond to "minute traces," and the "faintest trace;" as this is most important, when albumen has *such a very high atomic weight?* According to his own quantitative analysis, Experiment 7, in your last Journal, he proves (is he aware of it?) that 483 grains of albumen *intensely combine* with ·08 grain of arsenious acid; *i.e.* about six equivalents of albumen with one of arsenious acid.

Mr. Herapath's method for estimating the quantity of arsenious acid, *by precipitation as sulphide*, is not an accurate one.

Rosé says:—"He might calculate the quantity of arsenious acid from that of the sulphuret of arsenic produced, though even in that case the result would be erroneous, because the sulphuret contains more sulphur

than is found by calculation;" and Fresenius remarks:—"The free sulphur is to be determined as sulphate of baryta, and the thus ascertained weight of the free sulphur subtracted from the total weight of the precipitate."

It is surprising that Mr. Herapath, after stating in your pages, "It is my intention to repeat my experiments, with such precautions as will preclude all possibility of error," &c., should have still left himself liable to a mistake in his arsenic determination.

Does albumen act as an antidote to arsenious acid?

"Experience has already answered this question" in the affirmative. If large quantities of albumen are administered immediately after arsenious acid, poisoning does not take place.

Is the so-called arsenite of albumen really innocuous?

If Mr. Herapath will give any quantity of his compound (six of albumen and one of arsenious acid) to a cat, he will find it to be really innocuous.

My opponent concludes his results with an experiment to get rid of any arsenite of potassa (soda). Mr. Herapath has it soda, while Dr. Prout and others state that the free alkali in white of eggs consists of potassa and soda. I find it to contain the two. It will be as well, and also interesting, to introduce here the analysis of the white of egg. The white of egg gave me, when evaporated to dryness, 14·42 per cent. of residue.

Analysis of the White of Egg. By Dr. Muspratt.

Water, ...	80·87
Albumen, ...	12·93
Mucus and salts, . . .	6·20
	100·00

Dr. Prout obtained, by combustion, the following fixed constituents in 1000 grains of the white of egg, from three different eggs:—

	I.	II.	III.
Sulphuric acid, ...	0·29	0·15	0·18
Phosphoric acid, . . .	0·45	0·46	0·48
Chlorine, ...	0·94	0·93	0·87
Potassa, soda, carbonate of potassa, carbonate of soda, . .	2·92	2·93	2·72
Lime, magnesia, carbonate of lime, carbonate of magnesia, .	0·30	0·25	0·32
	4·90	4·72	4·57

Mr. Herapath used spirits of wine to dissolve out the arsenite; but he remarks, after all his caution:—"I assured myself that all but the faintest trace of arsenite was extracted from an albumen coagulate containing arsenite of soda by this process." Surely an experienced chemist like Mr. Herapath ought not to leave even *the faintest trace* of arsenite in his coagulate. If the spirits of wine *will dissolve out* the arsenite, why did not Mr. Herapath use enough of it, and get rid of the

faintest trace? If he gives a coagulate to a cat, containing arsenite of an alkali, and "it partly recovers," it shows there was not enough of the arsenite present to cause death; but it has nothing whatever to do with the question, is sexalbuminate of arsenic poisonous?

I have now exhausted my subject, and must sum up with the arguments for and against the existence of the astonishing compound of arsenious acid and albumen.

For.	*Against.*
1. Albumen, in large quantities, is an antidote to arsenious acid.	1. No RELIABLE EXPERIMENTAL PROOFS, as the arsenic could not be entirely washed away.
2. Albuminate of arsenious acid (albumen coagulated with arsenious acid) cannot be deprived of every trace of arsenic, by digestion in, or weeks' edulcoration with, boiling water. Proved by the experiments of Herapath, Fairrie, Gaskell, Forster, Mercer, Danson, Muspratt, &c. &c.	2. Mr. Herapath:—"My recent investigation has only served to confirm me that Liebig's hypothesis is untenable." This is only an opinion.
3. Arsenite of albumen, when perfectly free from arsenite of an alkali, is not poisonous.	

My late researches only serve to convince me that I am right; and they undoubtedly prove that arsenious acid and albumen *do combine*. If other chemists of note think the matter worthy an investigation, I feel assured that their experiments will corroborate all those that have been made by me and my students.

THE FORMATION OF ORGANIC COMPOUNDS.

BY DR. CHARLES LÖWIG.

MOST inorganic compounds can be prepared directly from their elements, and can again, by analytical operations, be resolved into their principle and most remote constituents. In a similar way organic compounds cannot be obtained, but are formed by the decomposition of inorganic compounds, either through the vital force of plants with the co-operation of light, or without the assistance of the vital force, and by the decomposition of existing organic compounds through many influences.

The inorganic materials for the formation of organic compounds, under the influence of the vital force of plants, are carbonic acid, water, and ammonia. It is well known that the lower order of plants, as the fungi, consist of cells, each of which represents a plant; and that, through the union of these cells, the cellular tissue of the higher order of plants is formed. These cells are the most important organs of the plant, as in them, by the co-operation of the yellow and green rays of sunlight, the formation of organic compounds takes place. The green

parts of plants, particularly the leaves, possess the power of decomposing the carbonic acid of the air as well as the water; consequently, in defiance of the original affinities by which the elements of these compounds were combined, the carbon of the carbonic acid forms, with the hydrogen of the water, organic radicals or molecules. These radicals either combine with one another, or with one portion of the evolved oxygen of the carbonic acid and water, whilst the other portion is passed into the atmosphere. In most cases, plants evolve as many volumes of oxygen as they absorb carbonic acid. This general result must ultimately happen when the absorption of carbonic acid is not attended with the formation of organic bodies, because it is plants which prevent the accumulation of carbonic acid in the atmosphere, and preserve it of an uniform mixture. Certainly, leaves absorb oxygen and evolve carbonic acid during the night, and in the same manner, the parts of plants which are not green, by day and night take up oxygen and give off carbonic acid; but, nevertheless, the quantity of oxygen which plants contribute to the formation of carbonic acid is much smaller than that which the green parts of plants throw off by day.

Plants in a similar way absorb the constituents of ammonia, which arise from the continual decomposition of animal matter in great quantity, and which partly contribute to the formation of organic compounds: hence the source of nitrogenous organic radicals. A portion of the materials which are necessary to the existence and growth of plants are obtained by them from a limited number of organic bodies in a state of decomposition, but which are not in the form of carbonic acid and ammonia.

During the growth of plants, compounds which are formed in them undergo constant changes in their physical and chemical relations. The discovery of the conditions under which the formation of organic matters proceeds, as well as the changes these matters undergo, is the object of the physiology of plants and the basis of rational agriculture.

Without the assistance of the vital power in plants, only a few organic compounds can at present be prepared from inorganic materials; and it was believed, until a very recent period, that organic bodies could only be produced by the vital power of plants. This notion is however, through recent researches in the department of organic chemistry, completely set aside, and it is succeeded by the idea that complete organic compounds can be artificially made from inorganic substances, including those which are found formed in plants and animals. When bisulphuret of carbon, $C\,S_2$, and chlorine are conducted together through a red-hot porcelain tube, besides chloride of sulphur a compound consisting of $C_2\,Cl_4 = (C_2\,Cl)\,Cl_3$ is formed. This compound, when passed again through a red hot-tube, is broken up into chlorine, and $C_4\,Cl_6 = (C_4\,Cl_3)\,Cl_3$. When this body is treated with potash, three atoms of chloride of potassium, and $(C_4\,Cl_3)\,O_3$ or chloracetylic acid are obtained; and when upon this acid six atoms of potassium and three atoms of water are allowed to act, three atoms of chloride of potassium, three atoms of potash, and one atom of acetic acid $= (C_4\,H_3)\,O_3$ result.

Throughout the action of chlorine on bisulphuret of carbon under water, a volatile crystalline body is formed, which may be considered as

consisting of $C_2 Cl_4, 2 S O_2$. When this compound is saturated with a solution of caustic potash, an acid is obtained combined with the potash which consists of $C_2 Cl_3, S_2 O_5$, and when the same is exposed to the current of a two-paired zinc and charcoal battery, the chlorine by the presence of water is by degrees replaced by hydrogen, and in consequence compounds are formed which are composed of $C_2 H Cl_2, S_2 O_5$, $C_2 H_2 C$, $S_2 O_5$, and $C_2 H_3, S_2 O_5$. The body $C_2 H_3$ is methyl, which is found in the oil of gaultheria procumbens, combined with oxygen.

When nitrogen is conducted over a mixture of charcoal and carbonate of potash, heated to redness, cyanide of potassium, K, N C_2, is obtained. Cyanogen gives with hydrogen, prussic acid; and this acid and water form, by mutual decomposition, formic acid and ammonia. Heated potassium gives with carbonic oxide a compound which, by its solution in water, forms rhodizonate of potash, and which then again splits into croconate and carbonate of potash. Many other analagous formations of organic compounds from inorganic materials are still better known.

As we have previously shown, the individual elements of organic compounds are not in conformity with their original affinities combined with one another, and such compounds owe their greater or lesser constancy to the greater or lesser chemical resistance which the organic radicals that are bound up in them present. When the resistance is inconsiderable, that is, when the affinity of the radical is slight for the matter with which it is combined, and can be through the transposition of a single atom of the radical represent compounds of strong chemical characters, then always a great disposition to decomposition exists, and unimportant external circumstances are sufficient to produce this change. This disposition to the formation of compounds with strong chemical characters, overcomes the most powerful affinities, as is the case in the formation of organic compounds from carbonic acid and water by the vital functions of plants.

When the individual atoms of compound molecules combine in other proportions, to form fresh radicals and their compounds, in which the individual components present a mutually strong chemical resistance, the formation of these bodies arise from transposition.

When in the new compound the same number of elements are found as were contained in the original one, there results a polymeric or metameric body. Thus aldehyde, $C_4 H_4 O_2$, passes into metaldehyde, $C_{12} H_{12} O_6$, and essential oil of almonds, $C_{14} H_6 O_2$, into benzoine, $C_{28} H_{12} O_4$. But when the primary affinities of the elements overcome the chemical characters of the compound, its decomposition commences with the separation of inorganic matter. This decomposition is complete when all the individual atoms of compound radicals are in inorganic combination expelled. With such total destruction, every trace of an organic compound is lost. On the contrary, when the decomposition is partial, and only some individual atoms are expelled from the organic radical, then takes place in the same a formation of new radicals and compounds. Thus from ethyl, $C_4 H_5$, proceeds acetyl, $C_4 H_3$, by loss of H_2; by the expulsion of C_2 from acetyl, results methyl, $C_2 H_3$; and when methyl loses H_2, it passes into formyl, $C_2 H$.

The number of new compounds which can be obtained by partial decomposition is so much greater, indeed greater than the number of individual atoms of which an organic radical consists, the higher the order is to which the compound belongs. Bodies which only consist of carbon and hydrogen are, as a rule, very permanent; but when these are combined with oxygen, and, through any circumstance, the original affinities of the elements of their radicals are called forth, then the compound is decomposed, attended with the evolution of carbonic acid or water, or both. In all oxygenated organic compounds, the carbon and hydrogen atoms preponderate over the oxygen atoms. It therefore follows, from this condition, that the oxygen atoms combined with the radical, suddenly take up so many of the carbon and hydrogen atoms as are necessary to the formation of carbonic acid and water, and therefore a separation of carbon or carburet of hydrogen ensues. A sudden separation of the oxygen atoms, however, never takes place, because in the proportion in which the individual carbon and hydrogen atoms are withdrawn, new radicals arise, which, for the yet remaining oxygen possess an affinity; these radicals again are overcome by the original affinities of the oxygen.

In compounds of higher order, the conditions existing for their greater or lesser capacity of decomposition are mostly due to the opposite chemical properties of their principle constituents; indeed, the stronger these appear, the more permanent are their combinations; but the weaker their mutual attraction is, and the more compound these bodies are, the sooner they are resolved into their individual atoms, to form less complex compounds, which are more permanent, chiefly with the separation of carbonic acid and water; and those which contain nitrogen, with the separation of ammonia. To this class of bodies belong the general constituents of the vegetable kingdom, and particularly those of the animal organismus. In chlorine organic compounds, the primary affinity of the chlorine comes nearest in its relation to the hydrogen of radical. The organic molecule is decomposed by the chlorine under the formation of hydrochloric acid. In the same manner, according to the known laws of affinity of inorganic chemistry other compounds are to be viewed.

BENZOIC ACID, AND TESTS FOR ITS PURITY.

Dr. Mohr's process for obtaining benzoic acid which is adopted by the Prussian Pharmacopœia, unquestionably has the reputation of being the best. According to this process, coarsely powdered gum benzoin, is to be strewed on the flat bottom of a round iron pot which has a diameter of nine inches, and a height of about two inches. On the surface of the pot is spread a piece of filtering paper, which is fastened to its rim by starch paste. A cylinder of very thick paper is attached by means of a string to the top of the iron pot. Heat is then applied by placing the pot on a plate covered with sand, over the mouth of a furnace. It must remain exposed to a gentle fire from four to six hours. Mohr usually obtains about an ounce and a half of benzoic acid from twelve

ounces of gum benzoin by the first sublimation. As the gum is not exhausted by the first operation, it may be bruised when cold and again submitted to the action of heat, when a fresh portion of benzoic acid will sublime from it. This acid thus obtained, is not perfectly pure and white, and Mohr states that it is a question, in a medicinal point of view, whether it is so valuable when perfectly pure, as when it contains a small portion of a fragrant volatile oil, which rises with it from the gum in the process of sublimation.

The London Pharmacopœia directs that it shall be prepared by sublimation, and does not prescribe that it shall be free from this oil, to which it principally owes its agreeable odour.

By the second sublimation the whole of the benzoic acid is not volatilized. What remains in the resin may be separated by boiling it with caustic lime, and precipitating the acid from the resulting benzoate of lime with hydrochloric acid. Benzoic acid can be obtained also in the wet way, and the resin yields a greater product in this process than in the former; yet it has a less pharmaceutical value, because it is free from the volatile oil which, as above stated, gives it its peculiar odour. The old method devised by Scheele is still the best, which is as follows:—Make one ounce of freshly burnt lime into a milk with from four to six ounces of hot water. To the milk of lime, four ounces of powdered benzoin and thirty ounces of water are to be added, and the mixture boiled for half an hour, and stirred during this operation, and afterwards strained through linen. The residue must be a second time boiled with twenty ounces of water and strained, and a third time with ten ounces; the fluid products must be mixed and evaporated to one-fourth of their volume, and sufficient hydrochloric acid added to render them slightly acid. When quite cold, the crystals are to be separated from the fluid by means of a linen strainer, upon which they are to be washed with cold water, and pressed, and then dissolved in hot distilled water, from which the crystals separate on cooling. When hydrochloric acid is added to a cold concentrated solution of the salts of benzoic acid, it is precipitated as a white powder. If the solution of the salts of this acid is too dilute and warm, none or only a portion of the benzoic acid will be separated. However, the weaker the solution is and the more slowly it is cooled, the larger will be the crystals of this acid. In the preparation of this acid in the wet way, lime is to be preferred to every other base, because it forms insoluble combinations with the resinous constituents of the benzoin, and because it prevents the gum resin from conglomerating into an adhesive mass, and also because an excess of this base is but slightly soluble. Stoltze has recommended a method by which all the acid can be removed from the benzoin:—The resin is to be dissolved in spirit, to which is to be added a watery solution of carbonate of soda, decomposed previously by alcohol. The spirit is to be removed by distillation, and the remaining watery solution, from which the resin has been separated by filtration, treated with dilute sulphuric acid, to precipitate the benzoic acid. This method gives the greatest quantity of acid but is attended, with a sacrifice of time and alcohol, which renders it in an economical point of view inferior to the above process of Scheele. It is

so far valuable, that the total acid contents of the resin can be determined by it.

Dr. Gregory considers the following process for obtaining benzoic acid the most productive*. Dissolve benzoin in strong alcohol, by the aid of heat, and add to the solution, whilst hot, hydrochloric acid, in sufficient quantity to precipitate the resin. When the mixture is distilled, the benzoic acid passes over in the form of benzoic ether. Distillation must be continued as long as any ether passes over. Water added towards the end of the operation, will facilitate the expulsion of the ether from the retort. When the ether ceases to pass over, the hot water in the retort is filtered, which deposits benzoic acid on cooling. The benzoic ether and all the distilled liquids are now treated with caustic potash until the ether is decomposed, and the solution is heated to boiling, and super-saturated with hydrochloric acid, which afterwards, on cooling, deposits, in crystals, benzoic acid.

Benzoic acid, as it exists in the resin, is the natural production of the plant from which the resin is derived. It may also be produced artificially. Abel found that when cumole (C_{18} H_{12}) was treated with nitric acid, so dilute that no red vapours were evolved, for several days, this hydrocarbon was converted into benzoic acid. Guckelberger has, by the oxidation of casein with peroxide of manganese and sulphuric acid, obtained as one of the products benzoic acid. Albumen, fibrin, and gelatin yielded similar results when treated as above. Wöhler has detected benzoic acid in Canadian castor, along with salicin. It is also formed by the oxidation of the volatile oil of bitter almonds. Benzoate of potash results when chloride of benzoyle is treated with caustic potash. Benzoic acid in the animal economy is converted into hippuric acid, which may, by the action of acids, be reconverted into benzoic acid.

Benzoic acid should be completely volatile, without leaving any ash or being carbonized when heated. When dissolved in warm water, to which a little nitric acid has been added, nitrate of silver and chloride of barium should produce no precipitates. Oxalate of potash should give no turbidity to an ammoniacal solution of this acid. When heated with an excess of caustic potash it should evolve no smell of ammonia, otherwise, it has been adulterated with sal ammoniac. In spirit, benzoic acid is easily soluble, and requires 200 parts of cold and 20 parts of boiling water to dissolve one part of it. It forms two beautiful salts with ammonia which are frequently used in medicine, which, although not occupying a place in the Pharmacopœia, are yet readily prepared by direct combination of the acid with ammonia. With lime, it forms a salt soluble in water; which circumstance, together with its own comparative insolubility in that menstruum, distinguish it from all the organic acids of the Pharmacopœia.

ON SEA-WATER.

BY G. J. MULDER.

Sea-water, from different parts of the globe, always contains the same ingredients. The difference in the quantities of the ingredients

* "Handbook of Organic Chemistry."

is at the most small, and arises from the nature of the beds of the ocean, from the dilution of the sea-water by the flowing of rivers into it, and by rain, and through the ice masses of the polar regions. The great resemblance in the composition of various sea-waters is shown by the specific gravity of the different kinds. Twenty-eight specimens, collected on a journey from Java to Holland, in different degrees of latitude and longitude, gave a density, at 54° Fahr. for the highest, of 1·02891, and for the lowest, 1·02711.

River-water has very little influence on the composition of sea-water, as may be readily seen by a comparison of the saline contents of sea-water with those of rivers. Mulder found, in 5000 parts of river-water, in Holland, one part of salt, while in the same quantity of sea-water 185 parts exist. Consequently, it will be perceived that the sea-water of the coast, near the mouths of rivers, is only a more or less diluted solution of the preceding salts in sea-water.

When the analyses of sea-waters, collected from various parts of the ocean, are compared with one another, they are found to vary only apparently, which arises from the manner in which the constituents are grouped. When they are reduced to one standard a great similarity is exhibited. The means by which the analyses of several chemists were thus rectified are the following:—

The presence of chloride of sodium in sea-water requires no argument. That the lime is combined with sulphuric acid, I have previously shown; and also that the sulphuric acid, which is more than sufficient to saturate the lime, is in combination with the magnesia. When more magnesia is present than is sufficient to saturate this acid, then it exists as chloride of magnesium.

Upon the chief constituents of sea-water, the chlorides of sodium and magnesium, and sulphates of magnesia and lime, there can be no difference of opinion. It is otherwise, however, with potassium; some consider that it exists in combination with chlorine, and others that it forms a salt with sulphuric acid. For the following reasons I consider that it is combined with chlorine:—When sulphate of magnesia and chloride of potassium are together dissolved in water, and the solution evaporated and cooled, crystals of sulphate of magnesia, and not of sulphate of potash, are separated. In the manner, by the evaporation of the mother-liquor of sea-water, crystals of sulphate of magnesia, of common salt, of a double salt of the sulphates of potash and magnesia, and of a double salt of the chlorides of potassium and magnesium are formed.

The silicic acid is, without doubt, combined with potash or soda; the phosphoric acid exists as ammonio-phosphate of magnesia when ammonia and magnesia are present in sea-water. When phosphate of lime and carbonates of lime and magnesia are contained in it, they are held in solution by free carbonic acid. Iodine and bromine may be considered as in combination with magnesia.

Mulder gives a table of the saline contents of sea-water, from sixteen analyses by different chemists, reduced to a common standard, which shows what a very slight variation there is in the quantities of the ingredients of sea-water, when collected from several portions of the

ocean. He gives, as one of these, a mean result, which was obtained in his laboratory from a large number of analyses, all of which very closely approximated in their numbers, and which is here annexed:—

Chloride of sodium,	78·5
Chloride of magnesium,	9·4
Sulphate of magnesia,	6·4
Sulphate of lime,	4·4
Chloride of potassium,	1·0
Bromide of magnesium,	0·17
Carbonate of lime,	0·04
Silicic acid,	0·009
Ammonia,	0·13

——*Scheikundige Onderzoekingen.*

VOLATILE OIL OF GAULTHERIA PROCUMBENS.

The chemical history of this oil is one of great importance and interest, affording, as it does, one of the examples where the progress of modern chemistry has succeeded in producing artificially a complex organic body, previously only known as the result of vital force.

This volatile oil is obtained from the winter green, an American shrub of the heath family, by distillation. When this plant is distilled, at first an oil passes over which consists of C_{10} H_8, but when the temperature reaches 464° Fahr., a pure oil distils into the receiver. Therefore the essential oil of this plant, like many others, consists of two portions—one a hydrocarbon, and the other an oxygenated compound; this latter is the chief constituent of the oil, and that which is of so much chemical interest, from the fact that it has been artificially prepared.

It is termed, when thus prepared, the spiroylate of the oxide of methyl, and is obtained when two parts of wood spirit, one-and-a-half parts of spiroylic acid, and one part of sulphuric acid are distilled together. It is a colourless liquid, of an agreeable aromatic odour and taste; it dissolves slightly in water, but in all proportions in ether and alcohol; it boils between 411° and 435° Fahr., and has a specific gravity of 1.173. This compound expels carbonic acid from its combinations, and forms a series of salts, which contain one atom of base and one atom of spiroylate of the oxide of methyl. It behaves therefore as a conjugate acid. Its formula is C_{14} H_5 O_5 + C_2 H_3 O.

The spiroylic acid may be separated from the natural oil by treating it with a concentrated solution of caustic potash at a temperature of 113° Fahr., when wood spirit is formed and evaporates, and the solution contains the spiroylate of potash, from which, when decomposed with sulphuric acid, the spiroylic acid separates and subsides in the fluid.

Spiroylic acid is also formed by the oxidation of spiroyligenic acid, and when saligenin, salicin, courmacin, or indigo, is heated with caustic potash.

THE MODEL SCHOOL OF PHARMACY.

In all public institutions there are Tapers and Tadpoles, men without any ideas of their own, or honesty of purpose, who are ready at all times, and in all places, to gild, with their hireling praise, the acts and sayings of the dominant power or faction. At the last Annual Meeting of the Pharmaceutical Society, these creatures having received their instructions from their patrons, made it their especial business to belabour with extravagant eulogiums the School of Pharmacy. This excess of praise, founded as it is on oft-repeated fallacies, and something worse, must show clearly to the discerning, that "there is something rotten in the state of Denmark,"—something which has no merits of its own to recommend it to favour, and, therefore, must be bolstered up by every device that those interested in this school can bring to bear.

Far be it from our intention to assert or insinuate that no member who praised the school did do so conscientiously, because we know there are many who will not take the trouble to inquire for themselves, and are consequently misled by those who have the strongest motives to disguise the truth, and who therefore believe honestly that the school is all that it is represented to be. It is to these men that we address ourselves, and not to those hirelings who, at their patrons' bidding, would be ready to gainsay to-morrow what they have flippantly asserted to-day; and who may be safely left to the avenging hand of time, which, sooner or later, unmasks all such organised hypocrisy.

To form a correct estimate of the Model School in Bloomsbury Square, it must be examined in detail, and compared with other similar establishments. In so doing we shall first notice the lectures on botany, which subject of instruction always forms one of the principle features of a School of Pharmacy.

As our object is to expose a vicious system, supported by deception, and not to injure the feelings of any individual unnecessarily, we have to state our conviction that the present Professor of Botany, Mr. Bentley, is not in any way responsible for the state of things of which the members of this Society have so much reason to complain; for we believe that the Society could not possess a more capable and unpretending instructor for its pupils than he is. And, moreover, he is the only officer of the Society who is inadequately remunerated, especially in comparison with the lavish manner in which it pays his colleagues. The inference we draw from these facts is, that he is not one of the family clique which arrogates to itself the right of disposing of the funds of this Society as though they were private property, and not a sacred trust to be administered for the benefit of the members at large.

Before commencing our argument about this Model School, we shall state a fact which cannot be controverted; namely, that Mr. Bentley delivers, at the Middlesex Hospital, a more complete course of lectures on botany than he does in the Pharmaceutical School. It will be admitted on all hands, that it is a matter of indifference to the education of the pupils whether his lectures are delivered in St. Marylebone Parish, or in the adjoining Parish of St. George, Bloomsbury, although some of the Council may, in the superabundance of their wisdom, think to the contrary. If this be admitted, and also the fact that Mr. Bentley gives a more perfect course of lectures at the Middlesex Hospital (and we would refer to the Professor himself for a corroboration of this fact), we ask for what honest purpose is this department of this Model School continued, or rather was brought into existence? Further, not to compare what Mr. Bentley does in one parish with that which he performs in another, we would inquire, did the perpetrators of this miserable imposture never hear of Dr. Lindley's lectures, and those of a number of other Professors, from which the pharmaceutical student might acquire the most suitable instruction in botany years before the pharmaceutical machine in Bloomsbury Square was dreamt of.

With reference to the botanical branch of the Model School in Bloomsbury Square, our readers will arrive from our statements at the conclusions, that there never was the slightest necessity for any lectures being established on botany to promote education amongst pharmaceutists, in consequence of ample means being previously provided in the Metropolis for this purpose; that the Society's lectures are less complete than those delivered by the same or any other professor; and that, for these reasons alone, this department of the school should never have been established; and, therefore, the sooner it is swept away, the better for the friends of this institution, and the advancement of the education of the pharmaceutical community.

We need not trouble our readers with any facts and arguments against the continuance of the lectures of Materia Medica, a much less important branch of education to the Pharmaceutist than either Chemistry or Botany, as the facts and arguments against them are identical to those which we have advanced against the lectures on Botany.

In fact, pharmaceutical students have for years anticipated, by their acts, our arguments and facts, by the significant process of not attending these lectures; and, besides, it has been acknowledged repeatedly, in the Annual Report, that these lectures were a palpable failure in consequence of the scarcity of hearers. For a school to be a model school, it should be tolerably perfect and worthy of imitation in its parts or details. This truism brings us to the inquiry, why were not these model lectures, delivered in this model school by such model men,

published in the Society's Transactions, so that the country members and associates, who constitute more than three-fourths of the Society, and who pay for the lectures in a smaller proportion, might derive some advantage from them as well as the town ones?

With a strange inconsistency we have heard it argued, both by some of the lecturers, as well as those who are loudest in sounding the praises of this model school, that the lectures, as delivered, were so imperfect and desultory, that in print they would not bear the public gaze. We admit that this explanation is correct, as regards the lectures of many Professors, but it will readily occur to our readers to ask whether the mediocrity of talent, which produces these results, ought to be tolerated in a model school, and whether model professors, whose teaching would be models for imitation, are not the principal elements for the foundation of a model school.

We have done with this outrageous twaddle about the Model School, except by remarking that the Annual Report, which must have so disgusted our readers with the word "model," is a model report of impudent assertion, unsupported by truth, which will much more speedily bring retribution on its authors than conviction on the minds of its readers.

One word more to the members of the Pharmaceutical Society. It is currently reported, with an industry that would do credit to a better cause, that the bulk of the members are delighted with this Model School, and are only too happy to pay its cost,—a cost which is gradually verging the Society into a state of bankruptcy, and willingly adopt the sentiments of the above-mentioned Tapers and Tadpoles. If this report be false, which we have every reason to believe it to be, the members diffused over the country should give such unmistakeable manifestations of their opinions and feelings by individual remonstrances forthwith addressed to the Council, as would accomplish more towards bringing such abuses as this Model School, which is maintained alone for private ends and interests, to a finish, than any exertions, however determined, of a minority in the Council.

THE "PRETENDED QUALIFICATION" OF THE MEMBERS OF THE PHARMACEUTICAL SOCIETY.

Incomprehensible as the phrase above quoted may appear in the abstract, it contains nevertheless, we are constrained to admit, a truth which, coming from the quarter it does, whether in jest or earnest, is a cruel and bitter satire upon the Pharmaceutical Society and those gentlemen who have, for a number of years, so disinterestedly and liberally supported it. In the last Annual Report of the Council of this Society, published in

what is patronizingly termed their Journal, occurs a passage in that part of it which speaks of Pharmaceutical legislation, as follows:—"The Bill does not propose to interfere with the sale of common medicines by grocers and others, provided such persons do not pretend to be pharmaceutical chemists. The prohibition is not against exceptional cases, in which the necessities of the public may require that medicines should be obtainable from such persons, but is against the fraudulent assumption of a *pretended qualification*." Now we contend that, for a person to assume a qualification which he does not possess, such qualification must have become recognized as a legal, or by common consent, a sufficient or genuine one; therefore, if acknowledged as a qualification at all, it cannot be a pretended one. With equal consistency, a person having stolen a shilling might be accused of having fraudulently obtained the possession of a pretended one, for to have fraudulently obtained the possession of a pretended one, it must necessarily be a counterfeit, consequently no shilling at all; therefore the qualification alluded to in that Report, according to its authors, must also be a counterfeit qualification.

We will now take a passing glance at what we presume constitutes the nature of this so-called pretended or counterfeit qualification, which has been so industriously paraded before the world, and palmed upon the unsuspecting public by the originators of this Society; and also so ingeniously and successfully used to extract from the pockets of chemists and druggists that support, without which it would be impossible for those that assume to rule the destinies of the trade to carry on their schemes of plunder and self-aggrandisement. We believe the actual nature of the qualification conveyed by the possession of this diploma, is that of being a member of the Pharmaceutical Society, which, in point of fact, is a mere money one, or a receipt for a certain sum per annum. What we should consider a qualification to entitle the holder to practice pharmacy, would be the possession of such a knowledge of the scientific and practical details connected with his profession, that would enable him to pass the examination which has been established, and having passed which, we should imagine he had accomplished all that was necessary; but such is not the case, as in addition to his intellectual and practical ability, he must possess a more potent spell than intellectual culture—a more tangible ability than practical skill, he must possess the means to commence business; and having commenced business, he will then be privileged to obtain the distinguished honour of being elected an M.P.S., with all its concomitant advantages. But the accomplishment and possession of this coveted honour does not rest here; with an inconsistency and design peculiar to this Society, as if it were a beef-steak or a goose club, the continued possession of this qualification is dependent upon

the possessor's means or willingness to pay an annual fee or subscription as a penalty, we may say, for having devoted both time and money to better qualify himself to pursue the duties of his calling with advantage to himself and satisfaction to the public.

Amidst all the apparent prosperity, external gloss, and promised advantage in which the principal actors have veiled this Society, in order more effectually to pervert it to their own purposes; in spite of all their mystification, a faint glimmer of truth will sometimes escape through the haze, which becomes more startling from its rarity, but which, notwithstanding, is not less effectual in arousing their deluded victims from that dreamy slumber of hope deferred and disappointed indifference into which they have fallen. In short, the result of all the grudged subscriptions, the lavish expenditure, and the patient toleration of the whole system of deception, may be compared, in the sequel, to the mountain in labour; and if any confirmation of this statement were needed, we would refer the sceptical to the Pharmacy Bill as the result of ten years' sacrifice on the part of the members, and of ten years' exertions by their disinterested champions and benefactors.

FACTS AND DISCOVERIES IN SCIENCE.

On the Growth of various kinds of Mould in Syrup.—Professor Balfour, the Professor of Botany in the University of Edinburgh, has read a valuable paper on this subject, at the Botanical Society in that city, in which he states that mould of various kinds, when placed in syrup, has a tendency to spread out, and form a flat, gelatinous, and leathery expansion. This he shows by experiments as follows:—Mould that had grown upon an apple was put into syrup; and in the course of two months there was formed upon the syrup a cellular, flat, expanded mass, while the syrup was converted into vinegar.

Mould that had grown upon a pear was also put into syrup, and the same result was produced. He also experimented in the same manner with various moulds that were growing upon bread, tea, and some other vegetable substances; the effect produced, in most cases, was to cause a fermentation, resulting in the production of vinegar. In another experiment, a quantity of raw sugar, treacle, and water, were put into a jar, without any mould being introduced. When examined, after a lapse of four or five months, a growth like that of the vinegar plant was visible, and vinegar was formed. This plant was removed, and put into fresh syrup, which was followed again by the production of vinegar. It appears that, when purified, white sugar only is used to make syrup, the plant, when placed in it, does not produce vinegar so speedily; the length of time required for the changes varying from four to six months. Dr. Balfour thinks this may possibly be owing to the presence of some ingredient in the raw sugar and treacle, which may tend to promote the production of vinegar.

In connection with this subject, I may refer to the *Vinegar Plant* which is considered by some eminent botanists to be an unnatural and peculiar form of some fungus. This plant, which has a tough gelatinous consistence, when put into a mixture of treacle, sugar, and water, gives rise to an acetous fermentation. The vinegar, which is the result of this acetous fermentation, is of a syrupy nature; and when evaporated to dryness, a large quantity of saccharine matter is left. Various conjectures have been hazarded as to the origin of this vinegar plant; some stating that it came from South America, or other distant regions; and others, that it is a spontaneous production. Dr. Lindley is of opinion that it is a peculiar form of *penicillum glaucum*, or common blue-mould. The general opinion appears to be, that it is an anomalous state of mould, or of some fungus; and the peculiar form and consistence it assumes on different occasions, seem to depend upon the nature of the material in, or upon which, it makes its appearance.

Kousso, or Cusso.—Bruce, in his "Travels in Abyssinia," thus describes the plant, or tree, which produces this new remedy for tape-worm:—"The Cusso is one of the most beautiful trees, as also one of the most useful. It is an inhabitant of the high country of Abyssinia, and indigenous there. I never saw it in the Kolla, nor in Arabia, nor in any other part of Asia or Africa. It is an instance of the wisdom of Providence, that this tree does not extend beyond the limits of the disease of which it was intended to be the medicine or cure.

"The Abyssinians, of both sexes, and at all ages, are troubled with a terrible disease, which custom, however, has enabled them to bear with a kind of indifference. The Kousso, or Cusso, is administered by *infusing* a handful of the dry flowers in about two English quarts of *bouza*, or the beer they make from *taff;* after it has been steeped all night, the next morning it is fit for use. During the time the patient is taking the Cusso, he makes a point of being invisible to all his friends. The Cusso is planted always near churches, among the cedars which surround them, for the use of the town or village. The whole cluster of flowers has very much the shape of a cluster of grapes, and the stalks upon which it is supported very much like the stalk of the grape. The flower itself is of a greenish colour, tinged with purple; when fully blown, it is altogether of a deep red or purple."

Muscuna.—This is another plant from Abyssinia, which is likely to be a successful rival to the Kousso, and which is also from that part of the continent of Africa. The powder of the root is directed to be taken before breakfast, in doses of an ounce. An authority, in one of the German journals, states that he has used it, with good results, in several cases of tape-worm.

Chloroform as an Antiseptic Agent.—In a former number of the "Annals of Pharmacy and Practical Chemistry," the antiseptic property possessed by chloroform was referred to. Since then I find that Messrs. Augend and Robin have made a series of experiments upon the comparative antiseptic powers of ether and chloroform, which prove that the latter is much more antiseptic than the former. M. Augend states that to prevent completely the putrefaction of fresh meat, $\frac{1}{200}$th part of chloroform is amply sufficient. Its vapour passes through the most dense

tissues; it does not coagulate albumen like creosote, and is not decomposed by the muscular fibre. The most obvious action of chloroform upon muscular substance, and upon the fleshy pericarp of seeds and fruits, is the production of an immediate contraction of the fibre, or parenchyma, expelling the aqueous juices to the bottom of the vessel in which the experiment is conducted. He suggests, among various other applications, that this substance might be found of advantage when it was desired to preserve a corpse for a certain period for the purposes of legal medicine. In connection with this suggestion of his, I happen to know that chloroform has been successfully employed in the preservation of anatomical specimens, and of various preparations connected with morbid anatomy.

M. Robin has conducted a series of experiments upon the volatile compounds of carbon and hydrogen, which possess the property of preserving animal substances, notwithstanding the presence of oxygen, as sulphuric ether, chloroform, naphtha, oil of pit-coal, &c. These bodies, and their vapours, possess complete antiseptic power, the blood in the fleshy substance being maintained in quite a fresh state. Water impregnated with the vapour of these hydro-carburets possesses similar power. M. Robin has also proved by experiment, that sulphuret of carbon, protochloruret of carbon, carburet of nitrogen, the Dutch fluid, and hydrocyanic acid, are, like the carburets of hydrogen, powerful preservatives of organic matters. He states that the vapour of these substances, disengaged at the ordinary temperature in closed vessels, preserves such matters for an indefinite period.

Nitrate of Silver.—This article is the basis of the greater number of the cosmetics, and of the more or less celebrated dyes, which have been vaunted for their efficacy in imparting a rich black colour to the hair. To accomplish this end, it is employed in the liquid form as washes, and in the form of pomade. Most of these cosmetics are uncertain in their effects, and some of them not easy of application. The three following are selected on account of their simplicity:—

1. Take of nitrate of silver, one drachm; distilled water, one ounce; raw sugar, sufficient to colour the solution: mix. This is to be applied by means of a fine comb dipped in the solution, taking care not to touch the surrounding skin.

2. Take of nitrate of silver, cream of tartar, of each two drachms; weak liquor of ammonia, half an ounce; fresh lard, half an ounce: mix. The pomade to be applied to the hair, avoiding the surrounding skin, by means of a comb or brush.

3. Take of nitrate of silver, proto nitrate of mercury, of each half an ounce; distilled water, four ounces: dissolve, filter, washing the filter with distilled water, so as to increase the filtered solution to five and a half ounces. This solution is then to be made into a clear paste, by mixing with it a sufficient quantity of the finest starch. With this paste the hair is to be anointed at night, and then covered with oiled silk; in the morning the paste should be carefully washed off, and some ordinary pomatum applied afterwards.

In the last number of the "Annals of Pharmacy and Practical Chemistry," I directed the attention of your readers to Mercer's process of

preparing cotton for various dyes, by the action of caustic soda upon that material. Dr. J. H. Gladstone has communicated to the public the results of some experiments he has made on this substance, by which he has succeeded in procuring the compound of cotton and soda free from adhering alkali, by means of the action of absolute alcohol. He finds that the proportion of soda that combines with lignine, varies with the strength of the solution employed; but, under no circumstances whatever does it exceed one atom. He does not consider that *Mercerized* cotton is chemically different from the original lignine; but he affirms that it is identical in composition, the change in its properties being due to the change in its physical condition. Examined by the microscope, the fibres of cotton, in their ordinary state, appear as twisted bands flattened; but as soon as they are acted upon by the alkaline solution, they unravel themselves, contracting in length, and swell out, assuming a rounded solid form, retaining this appearance even after the alkali is washed out by water. The chemical formula of this compound of cotton with soda, is C_{24}, H_{20}, O_{20}, Na O. The action of caustic potass on cotton, resembles that of caustic soda, the result of which is a compound, whose chemical formula is C_{24}, H_{20}, O_{20}, K O.

C.

PREPARATION OF MARKING INKS FOR LINEN.

BY JULES GUILLER.

The author, who has received five years' exclusive privilege in Paris for the manufacture of marking inks, for the processes which he has invented for making them, states that none of the marking inks used heretofore completely answer the purpose intended. Some produce a yellowish stain on linen; and others, although marking black in the first instance, become gradually washed out. To remedy these evils, and to avoid the use of two fluids in marking linen, he has devised three processes for making marking ink, which are as follows:—

Formula No. 1.

Nitrate of silver	11 parts.
Distilled water	85 ,,
Powdered gum arabic	20 ,,
Carbonate of soda	22 ,,
Liquor of ammonia	30 ,,

The twenty-two parts of carbonate of soda are to be dissolved in the eighty-five parts of distilled water; and this solution rubbed with the gum in a mortar until it is dissolved. The eleven parts of nitrate of silver are to be dissolved in the twenty parts of liquor of ammonia, and then mixed with the soda solution. The mixed fluids are then to be warmed in a flask, by which they become at first greyish black, and partly coagulated; afterwards brown, and then clear; and lastly, when the ink boils, very dark, and of such a consistence that it will flow readily from a pen. This ink, and the one prepared according to the second

formula, form no precipitates, and thicken by boiling, whereby their colours become darker, and their ammoniacal odour weaker.

Formula No. 2.

Nitrate of silver	5 parts.
Distilled water	12 ,,
Powdered gum arabic	5 ,,
Carbonate of soda	7 ,,
Liquor of ammonia	10 ,,

These ingredients are to be treated in the manner above described, and the resulting mixture heated in a flask until it has become of a very dark colour, which is generally the case when its volume has diminished about five per cent. by evaporation. By continuing the evaporation too long, a precipitate is produced, in consequence of the loss of ammonia.

The ink prepared in this manner is distinguished by producing very black characters on linen, and is very suitable for marking with stamps.

Formula No. 3.

Nitrate of silver	17 parts.
Distilled water	85 ,,
Powdered gum arabic	20 ,,
Carbonate of soda	22 ,,
Liquor of ammonia	42 ,,
Sulphate of copper	33 ,,

The twenty-two parts of carbonate of soda are to be dissolved in twenty-five parts of distilled water, and the seventeen parts of nitrate of silver in the forty-two parts of ammonia. The twenty parts of gum are to be dissolved in the remaining sixty parts of water, and mixed with the soda solution, and afterwards with the silver solution. At last, the thirty-three parts of sulphate of copper are to be added.

The large quantity of ammonia in this formula is explained by the presence of the copper salt. The sulphate of copper could be replaced by nitrate of silver; but to do so, requires a much larger quantity of nitrate of silver, to render the ink as dark as it is with the copper salt. This compound differs from the others, inasmuch as it has a blue, whilst they have a dark brown colour.

The proportions of the ingredients in these formulæ can be altered according to the thickness of the ink required, or according to the use to which it is to be applied, or according to the material which is to be marked.——*Journal de Pharmacie.*

GROWTH OF CELLS IN PLANTS.

The whole process which is called growth in plants consists, in its essential elements, of a continuous propagation of cells, called secondary or daughter cells, whence the number of cells become multiplied beyond credibility. From an approximate calculation, for example, in a rapidly growing fungus, the *Bovista gigantea*, 20,000 new cells are formed every minute.

THE FORMATION OF SULPHURIC ACID BY THE ACTION OF SULPHUROUS ACID AND OXYGEN ON CERTAIN BODIES.

BY M. WÖHLER.

We know, from the researches of M. Doebereiner and other chemists, that several metallic oxides, as well as platinum, possess the property of keeping up the combustion of the vapour of alcohol a considerable time. It occurred to M. Wöhler, as very probable, that a similar action might also take place in the case of a mixture of sulphurous acid and oxygen gas; and he, therefore, directed M. Mahla to undertake several experiments on the subject. For this purpose the oxide of the metal was placed in a glass tube, exposed to a dull red heat, a mixture of about two volumes of dry sulphurous acid gas, and one volume of oxygen gas or atmospheric air being passed through the tube.

1. *Oxides of Chrome, Iron, and Copper.*—Each of these oxides, employed separately, immediately induced the formation of a thick white cloud of sulphuric acid. A mixture prepared by precipitation of oxide of copper and chrome, acts with peculiar energy. A single quantity of oxide appears capable of transforming indefinite quantities of this gas into sulphuric acid. The formation of acid by this process is so easy and abundant, that it is not difficult to foresee its extensive practical application.

2. *Oxides of Copper and Iron.*—Heated in sulphurous acid gas without oxygen gas, these oxides were reduced; the first into a red protoxide, and the second into black oxydulous oxide, with formation of sulphuric acid vapours; but the reaction ceased as soon as the reduction was complete.

3. *Oxide of Chrome.*—Heated in sulphurous acid without oxygen this oxide experienced no change, and no traces of sulphurous acid were formed.

4. *Metallic Copper* introduced in the spongy form, on mercury, into a mixture of the gases.—This metal exercised no action on them at the ordinary temperature of the air, even after the lapse of several days. When the sponge was heated, sulphuric acid was formed, not however before the surface of the copper became coated with oxide.

5. *Caustic Lime.*—Heated in a mixture of the gases, the lime acquired a bright red heat, and was transformed into sulphate, without the formation of free sulphuric acid.

6. *Vapour of Water.*—Passed with a mixture of the gases through a porcelain tube submitted to a dull red heat, this vapour did not give rise to the formation of sulphuric acid.

7. *Platinum Foil.*—Leaves of polished platinum when treated with boiling sulphuric acid, alkali, and water, operated on a mixture of the dry gases in every respect like spongy platinum, with a quicker production at a red heat of anhydrous sulphuric acid, without its surface undergoing the least change. At ordinary temperatures it is inactive.

ON THE COLOURING MATTER AND OTHER CONSTITUENTS OF SAFFRON.

Quardrot has prepared the colouring matter of saffron in the following way:—The saffron was completely extracted by ether and then boiled with water; the clear watery solution was precipitated with diacetate of lead, and the resulting red precipitate washed with water, and decomposed by sulphuretted hydrogen, and the precipitate purified, from which the colouring matter is extracted by boiling alcohol. The spirituous solution was evaporated in a water-bath, the residue treated with water, and the watery solution evaporated to dryness. The colouring matter thus prepared is a red, inodorous powder, which dissolves in water with a yellow colour; a trace of an alkaline base promotes its solubility in a high degree. It dissolves easily in alcohol and with difficulty in ether. By concentrated mineral acids it is decomposed into a variety of colours. From its aqueous and alkaline solutions this colouring matter, upon the addition of a diluted mineral acid, is precipitated in reddish-brown flocks; also the vegetable acids, as tartaric, tannic, and gallic acids, produce red flocks. Diluted solutions of alkalies take up the colouring matter readily, and are coloured yellow thereby; concentrated solutions decompose it by a boiling heat, and by distillation yield an oily, volatile body, which has an odour different from saffron oil, and is lighter than water; but after some time becomes a brown mass, heavier than water. By heating the colouring matter to 248° Fahr. it becomes blackish-brown; to 356°, shining red; and to 392°, it is completely decomposed.

The colouring matter contains no nitrogen. When dried at 212° Fahr., the formula $C_{20}H_{13}O_{11}$ represents its composition. The precipitate obtained by adding basic acetate of lead to its aqueous solution, has the formula $3\,Pl\,O, O_{20}H_{13}O_{11}$. Its watery solution gives with copper salts a green, and with lime or baryta water a yellow precipitate. Saffron contains a volatile oil, to which it owes its peculiar odour. By distillation with water a yellow oil is obtained, with an agreeable odour, which is lighter than water, and after a short time becomes a whitish mass, heavier than water. By the evaporation of the ethereal extract of saffron, a yellow, fatty body remains, which, when treated with hot water, becomes when cold a snow-white mass, the melting point of which is 118° Fahr. It dissolves in boiling alcohol, and partly crystallizes thereout by cooling.

Saffron contains also grape sugar and, as it appears, a peculiar acid. It leaves by combustion 8·93 per cent. of an alkaline ash, which consists of carbonic, sulphuric, and phosphoric acids, chlorine, silica, lime, magnesia, soda, and potash.

OXYGEN IN THE ATMOSPHERE.

Our atmosphere, according to Poggendorf's estimate, contains about 1,954,578 cubic geographical miles of oxygen, while the respiration of man and animals together, with the various processes of combustion, consume annually about 2½ cubic miles; consequently, 250 cubic miles in 100 years, or only nearly a 10,000th part.

ON CARBONATE OF MAGNESIA.

H. Rose has made an important research respecting the behaviour of water towards acids in general, and particularly with reference to the carbonic acid in carbonates. Water appears to act towards weak bases as a base, but can also operate as an acid, and separate weak acids from their combinations with bases. In consequence the law does hold good, that by the decomposition of two neutral salts in solution, the resulting compounds are also neutral, if one of the acids of the two salts belongs to the weak kind. In this case the water acts as an acid, and separates a portion of the weak acid, and combines with a portion of the base which has lost the acid, to form a hydrate, in which the water is the electro-negative constitutent. It frequently happens that, by the employment of large quantities of water, the whole of the weak acids can be separated from their bases; but the general rule is, that a compound is formed which consists of a hydrate of the base, with a combination of the base with a weak acid, which cannot, by water, be decomposed.

Rose's research proves that which has been already pointed out by many chemists, namely, when a solution of a magnesia salt is treated with carbonate of soda, a precipitate is formed, consisting of five atoms of magnesia with four atoms of carbonic acid. This combination, when dried at 212° Fahr., has always the same constitution, whether obtained from concentrated, or diluted, or hot or cold solutions. It then contains five atoms of water. By the use of carbonate of potash a compound is often formed, which consists of four atoms of magnesia with three of carbonic acid. This compound, when dried at 212°, loses carbonic acid, and then contains four atoms of carbonic acid to five atoms of magnesia, with one atom more water.

When these compounds are heated to 302°, or even to 572°, they lose some carbonic acid, and are then composed of four atoms of magnesia and three atoms of carbonic acid; the quantity of water which they retain at these high temperatures is various. By a red heat only do they lose all their carbonic acid and water, and leave pure magnesia behind.

The neutral carbonate of magnesia can, as is well known, be readily obtained with water, and has the composition $Mg\ O,\ C\ O_2 + 3\ H\ O$. When it is heated to 212° it loses only two atoms of water. By pouring water upon it, and heating the liquid to a temperature under the boiling point of water, carbonic acid is expelled, and this salt is changed into that which is produced by precipitating magnesia salts with carbonates of the alkalies.

When the neutral salt is heated to 392° it remains neutral, but loses water. Only by 572° this compound begins to lose carbonic acid slowly, and water at the same time. After being heated for four days, during which the temperature never reached a dark red heat, it lost the whole of its carbonic acid and water. The magnesia obtained by a heat of 572°, when brought in contact with water, becomes heated; that which is obtained by a red heat has a far greater density, and does not become heated in contact with water. The anhydrous neutral carbonate of magnesia, a natural production, known under the name of magnesite, does not lose carbonic acid by a temperature of 572°, and is not decomposed; but when, in a pulverent form, it is boiled with water, it slightly evolves carbonic acid.

THE DETECTION OF WHEAT FLOUR IN RYE MEAL.

This method of detecting wheat flour in rye meal depends upon the insolubility of wheat gluten, and the solubility of the gluten of rye in water. To prove the adulteration in a short time, according to Bamihl, some coarse bran is taken, which has been freed from starch and gluten, by being steeped in water for three days, and mixed with the meal to be examined. This mixture is kneaded with a little cold water with the hands, by which the starch and some of the rye gluten are washed away. The wheat gluten remains hanging to the bran, and is separated from it by being rubbed between the hands. For this experiment two-thirds of a tea-spoonful of bran, and one tea-spoonful of the meal to be examined are required. It succeeds only, however, if, in the mixture of both meals, the wheat flour is in excess. When this is not the case, then half an ounce of the meal to be examined is to be mixed with two tea-spoonfuls of wheaten bran, and made into a compact dough with the necessary water. The dough is then to be kneaded in a double bag of fine texture under water, until the water ceases to become milky. The bags having been pressed are to be separated from one another; no gluten is to be found with the bran in the inner bag if only rye meal was present, or when present in a preponderating quantity. Should the contrary be the case, then gluten is to be found in the bran and between the bags. When pure wheaten flour is thus treated, the gluten remains chiefly with the bran, and only a little gets between the bags. Equal parts of wheaten flour and rye meal gives the most gluten ($\frac{2}{3}$) between the bags. With $\frac{7}{8}$ of wheaten, and $\frac{1}{8}$ of rye meal, the above result is reversed. In all experiments with mixtures, consisting of rye meal with $\frac{1}{8}$ and $\frac{1}{12}$, and even $\frac{1}{16}$ of wheaten flour, it was possible to discover the gluten.——*Poggendorf's Annalen.*

ANALYSES OF THE ASHES OF HAM, PORK, AND BEEF.

In the last number of Liebig and Wöhler's "Journal," there are two analyses, one of the ashes of ham, by C. Keil, and the other of the ashes of pork, by Echevarria, which are interesting, as showing what inorganic constituents are abstracted from and added to flesh by the process of salting; and also as pointing out the difference of quantities of inorganic substances taken into the animal economy when these meats are used as food.

Ashes of Ham.	Found.	Calculated to 100 parts, after deducting the chlorides of sodium and potassium, the charcoal and the sand.
Charcoal and sand	0,23	——
Potash	5,30	47,41
Lime	0,41	3,66
Magnesia	0,54	4,83
Phosphate of iron	0,10	0,89
Potassium	1,25	——
Sodium	34,06	——
Chlorine	53,72	——
Phosphoric acid	4,71	42,13
Sulphuric acid	0,12	1,08
	100,44	100,00

Ashes of Pork.

	Found.	Calculated to 100 parts, after deducting the sand and charcoal.
Potash	35,83	37,79
Soda	3,81	4,02
Lime	7,15	7,54
Magnesia	4,56	4,81
Peroxide of iron	0,33	0,35
Phosphoric acid	42,16	44,47
Sodium	0,38	0,40
Chlorine	0,59	0,62
Sand	2,74	——
Charcoal	0,51	——
	98,06	100,00

From the ham dried at 212° Fahr. and free from fat, Keil obtained 19,62 per cent. of ashes; and from pork dried at the same temperature, he obtained 4,40 per cent. of ashes. He also analyzed the ashes of salt beef, which he found to contain, when dried at 212° Fahr., 3,22 per cent. of ashes with the following result—

	Found.	Calculated to 100 parts, after deducting the chloride of sodium, silicic acid, and insoluble ingredients.
Charcoal and sand	5,50	——
Chlorine	25,95	——
Sodium	16,82	——
Potash	24,70	49,01
Lime	0,73	1,44
Magnesia	1,90	3,77
Phosphate of iron	1,04	2,06
Phosphoric acid	21,41	42,49
Sulphuric acid	0,62	1,23
Silicic acid	0,20	——
	98,87	100,00

THE SOLUBILITY AND HYDRATED CONDITION OF SILICIC ACID.

BY J. FUCHS.

In the following research the silicic employed was prepared by conducting fluo-silicic gas into water, and by washing it until the fluid which passed from it showed no reaction with hydro-fluo-silicic acid.

The moist hydrated silicic acid thus obtained was well washed with one and the same portion of water, then digested with cold and boiling hydrochloric acid, and filtered after each operation through double filters. The filtrates were evaporated to dryness in a weighed platina crucible, which left residues possessing the properties of silicic acid. Fifty grammes of the watery filtrate gave, when thus treated in two experiments, a mean of .013 per cent. of dissolved silicic acid; therefore one

part of this acid requires in a hydrated condition 7700 parts of water for its solution.

In two experiments made with hydrochloric acid, specific gravity 1.115, a mean was obtained which shows that 100 parts of this acid dissolves .009 parts of silicic acid, or one part requires 11,000 parts of cold hydrochloric acid of the above strength for its solution. In 100 parts of boiling hydrochloric acid .018 parts of silicic acid are dissolved; therefore one part of silicic acid requires in the hydrated condition 5500 parts of boiling hydrochloric acid for its solution. It follows from these experiments that silicic acid which has been once precipitated is not quite insoluble in water and acids, as Doveri and others have stated.

To estimate the composition of hydrated silicic acid, it was dried for thirty days over sulphuric acid. Three portions of this substance were then weighed, moistened with water, evaporated to dryness in a platina crucible, and exposed to a red heat and again weighed.

The quantity of water present, as deduced from a mean of these experiments, was 9.3 per cent. The formula of this hydrate may be thus expressed, 3 Si O_2 + H O, or 2 Si O_3 + H O, which is equivalent to 8.88 per cent. of water. When the hydrated silicic acid was dried at 212° Fahr., previously to the estimation of its water, it was found to contain, as a mean, of six estimations 6,72 per cent. of water. The formula of which would be 4 Si O_2 + H O.——*Annalen der Chemie und Pharmacie.*

PATENT MEDICINE LICENCE.

To the Editors of the "Annals of Pharmacy and Practical Chemistry."

GENTLEMEN,

I concur generally in the communication you inserted in your last number, from Mr. Gallard, respecting the Patent Medicine Licence. Its unfair operation has often been adverted to by myself in several of the medical and chemical periodicals, with a view to its alteration, so as to do justice to the fair trader, but hitherto without success.

That I should have to pay the same amount for my licence, *viz.*, £.2 annually, as the large wholesale houses, seems preposterous; such, however, is the fact, and all vendors of patent medicines are liable to the same charge within the limits of the old two-penny post; to remedy this there ought to be both a wholesale and retail licence, and the present variable scale abolished; moreover, I am of opinion that many do not pay for any licence at all, and more particularly as regards those who sell and often administer the precious compositions, yclept "vegetable," of a certain well known hygeist, who glories in confiding their sale to sundry grocers, tailors, shoe-makers, &c., in preference to the chemists and druggists. It would be well if the stamp office authorities would just look after such parties as evade the licence, to the great injury of the fair trader, instead of preventing the legitimate tradesman, who stands at heavy expenses, from putting up a box of pills without liability of being fined for so doing, if the label or direction specify a few words respecting their medical nature and tendency to relieve or cure.

Further, I should be glad to know, Gentlemen, what the Pharmaceutical Society has done towards removing this piece of injustice from those who suffer from it? The answer, I believe, is *nil.* As a body, that Society appears to me to be of very small use or benefit to the subscribers, and also very selfish and indisposed to impart what might render their Journal better worth its price, *viz.*, the lectures delivered at their institution for the benefit of those subscribers, at least, who reside at a distance, and pay their money to such little purpose.

I am, GENTLEMEN,

Yours respectfully,

Enfield, June 1852. JOHN TUFF.

TO CORRESPONDENTS.

F. T. Wilson.—There are no works on the subject mentioned by our correspondent except those written by audacious quacks, to allure victims within their meshes for the purpose of plundering them. Consult a properly qualified medical practitioner.

L. F., Dulwich.—The processes for making iodide, cyanide, and fluoride of potassium are sufficiently described in many manuals of chemistry, to which we must refer *L. F.*, not having space to insert a description of them.

Studens.—Liquid hair dye, not to blacken the skin, may be thus prepared:—Dissolve in one ounce of liquor potassæ as much freshly precipitated oxide of lead as it will take up, and dilute the resulting clear solution with three ounces of distilled water. Care must be taken not to wet the skin unnecessarily with it.

A Subscriber, Birmingham.—1. Caprylether is made by saponifying and distilling castor oil with a strong solution of caustic potash. This ether, when treated with acetic acid, yields the acetate of capryloxide. 2. Mansfield's process having been patented, renders anybody adopting it liable to an action at law. 3. For an account of oil of gaultheria procumbens, see page 208 of this Journal.

Spes.—It is against our rule to publish any letter with an assumed name, although we may privately be informed of the real name and address of the writer. This rule precludes the admission of much interesting matter in the "Annals," judging from the host of anonymous communications we receive; but nevertheless we are obliged to adopt the rule, to avoid the suspicion of concocting these letters ourselves. The only way to gain the object you have in view is by continual agitation, in spite of every disheartening circumstance, especially when the cause is a righteous one.

Chemicus.—The addition of oil of cloves to creosote, although an expensive admixture is nevertheless a fraud. It is added, by the person named, for the purpose of making the creosote manufactured by him different to the genuine article, by which means he has got a reputation—however astonishing the statement may be—for making a purer article than anybody else. In this way the medical profession, and even the chemist, are constantly imposed on, and the honest manufacturer driven out of the market by such wily fellows. We shall take an early opportunity of exposing this fraud, as the evidence is complete.

Mr. Robinson Boustead, Wigton.—1. To detect adulteration in cod-liver oil, see page 172 of the June number of the "Annals of Pharmacy." 2. Cantharides are best detected by their blistering properties and by their appearance under the microscope. 3. There is a recent edition of Hooper's "Medical Dictionary," which can be purchased for 30*s.*

A Country Druggist, Bradford.—We never received your former communication. Your inquiry is not sufficiently explicit to admit of being briefly answered. If you will send us your name, with your wishes stated fully, we will transmit by return of post an answer, to avoid delay.

A Reader, Wolverhampton.—1. Pectic acid is prepared by boiling the expressed juice of turnips with caustic potash, filtering the decoction, and adding chloride of calcium, to precipitate the acid, and then decomposing the precipitate with muriatic acid, to separate the pectic acid, which is washed to free it from the muriatic acid and lime. 2. Caffeine is made by boiling unroasted coffee with water, and precipitating the decoction with sugar of lead, and boiling it with oxide of lead until an addition of the oxide does not become coloured. From the filtered liquid the caffeine is obtained by evaporation. 3. "Hypo" means under, and is employed in chemistry to denote those substances which are in a lower degree of oxidation than some others of the same elements.

A Subscriber, Colne, should consult Parnell's "Applied Chemistry," or Knapp's "Chemical Technicology," for the information he requires, as we have no space for a long essay on the subject mentioned.

A Young Student, Burnley.—1. A soluble blue may be prepared by mixing six parts of Berlin blue, one part of oxalic acid, and ten parts of water. 2. We shall publish an article on chemical symbols and formulæ shortly.

Received, "The Canada Medical Journal, and Monthly Record of Medical and Surgical Science," edited by R. L. Macdonnell, M.D., and A. H. David, M.D. Montreal.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG.

Professor of Chemistry at the University of Giessen.

No. VII.

Operations which involve Mixing and Separation of the first degree.

Substances, which through solution have been combined, are frequently separated by cooling or volatilization; when by volatilization the fluid portion is distributed in the air, and the fixed portion which remains is the useful one, the operation is called evaporation. Often evaporation and cooling are applied for the precipitation of bodies. When the solid body is thus precipitated from a fluid in regular geometrical forms, the operation is called crystallization. Crystallization is the means by which solid bodies, mostly salts, are separated from their solutions. It has for its object either the separation of solid bodies in regular forms, or their purification by crystallization from foreign substances; or when several salts are dissolved in one menstruum, a separation of them, in consequence of the property which different salts possess of separating from their solutions in different times, according to their solubility; and, moreover, many salts in a crystallized form can thus be partly separated by mechanical means. To perform the operation of crystallization, the body to be crystallized is dissolved in a menstruum, or by other chemical powers a crystallizable solution is formed, which is evaporated to the point at which crystallization commences. The solution is then placed in the cold; or, when the salt is almost equally soluble in both warm and cold solution, the fluid is exposed to a slow but continued evaporation.

The vessels in which solution and evaporation are performed must not communicate any foreign substances. Salts are thus made on the large scale in tin, and tinned copper or iron vessels, and on the small scale in glass, porcelain, or earthenware vessels. Acids must not be treated, as a rule, in metallic vessels. For alkalies, an iron utensil is the most suitable. When the entire solution is not clear, it should be filtered before it is evaporated. When colourless crystals are desired,

and the solution is strongly coloured by organic matter, it should be treated with fresh animal or vegetable charcoal, and then filtered. The point at which crystallization commences may be known either by a pellicle forming on the surface of the hot liquid, or when a drop of it is placed on a cold plate, by cooling, it contains crystals. It is only with salts which are with difficulty soluble that evaporation must be continued until scales of crystals are formed. With easily soluble salts, particularly such as are more readily soluble in the heat than in the cold, the first test must not be applied, but only the second. Even the formation of crystals on a cold plate proceeds with difficulty with very soluble salts, particularly when the temperature of the plate is not low enough, then the best test is the specific gravity of the solution. The crystallization of such salts proceeds more easily in winter than in summer. The more slowly solutions to be crystallized are cooled, the larger and more regular are the crystals produced, and, moreover, shaking or stirring solutions interferes with this result. Crystals form, by the cooling of the solution, on the surface, at the sides of the vessel, and particularly around any particles of solid bodies which may be present in it. When strings or wires are suspended in the liquid, fine crystals form on them. Salts which are equally soluble in hot or cold liquids, crystallize by slow evaporation, and the more slowly this is conducted, the more regular is the form of the crystals. The largest crystals are produced by the spontaneous evaporation of their solutions in the air.

The resulting crystals are, when necessary, washed with water and dried, either in a gentle heat, or by the ordinary temperature of the air, according to their nature. The mother liquor from the crystals still contains crystallizable matter, to obtain which it must be treated as above described, and this operation repeated with the liquor separated from every crop of crystals as often as it continues to produce them.

Crystallization can also be effected when to a solution a fluid is added, which has affinity for the menstruum, but not for the salt; for example, by the addition of alcohol to the watery solutions of salts: in this case both fluids combine, and the salt is separated. By this means regular crystals can be obtained, when their separation is slowly performed, which can be accomplished by carefully pouring alcohol on the surface of saline solutions, so that the combinations of their water and the alcohol proceed very slowly.

Freezing is, under all circumstances, nothing but crystallization. It is sometimes employed in pharmacy to separate water from acids, as in the case of acetic acid: in this instance the portion which remains fluid is the valuable one. Also, by melting and slowly cooling substances, is crystallization effected, as in the preparation of cyanide of potassium.

In crystallization many remarkable anomalies are to be observed. To the smooth side of glass vessels crystals will attach themselves; but when the sides are covered with grease, crystals are repelled from so doing. In vessels of stoneware or wood, the crystallization of salts proceeds readily. Many very soluble salts crystallize with difficulty in glass; as, for example, a hot saturated solution of acetate of soda frequently does not crystallize at all when it is cooled in tall glass cylinders. Even agitation prevents crystallization in solutions when

they are so concentrated, that, even when warmed, they deposit saline crusts. Crystallization is best conducted by placing in solutions of salts pointed or angular bodies, metallic wires, or a crystal. It then proceeds rapidly, with the development of heat, which sometimes is so great as to re-dissolve a portion of the substance which has crystallized from the fluid. A solution of Glauber's salts saturated at a temperature of 95° Fahr., does not crystallize when cooled in closed and full bottles. When blown upon, it crystallizes. It may be kept unchanged in the air when covered with a film of oil of turpentine, and also without this film when the vessel is lightly covered with paper, and kept free from motion. Acetic acid can be kept without crystallizing in a closed vessel, at a temperature of 9° Fahr., and, besides, can be strongly agitated without producing this result; but, when the vessel is opened, even at from 46° to 50° Fahr., crystallization ensues immediately, whether the air which enters be warmer or colder than the solution.

Bodies do not always, by their separation from a menstruum, receive a regular or crystalline form. Organic compounds, especially when many are dissolved in one common menstruum, and are separated by evaporation, form an uncrystallizable mass. To this class belong extracts, resins, and other substances. When the juice of a plant, or its extract, is freed by evaporation from the greater portion of its fluid, an inspissated extract is obtained in the widest sense of the term. This operation has for its aim the separation of the active principles from the greatest portion of their watery menstruum, so as to concentrate them into a small space, by which they may be preserved for a long time, because, when combined with water, extracts are readily spoiled by fermentation.

The preparation of extracts requires much care. The evaporation must be conducted quickly, yet with a very gentle heat. In no case should the heat reach the boiling point of water. A variety of vessels are employed for their evaporation, such as pans, iron and porcelain vessels, and those previously described for crystallization. Care must be taken not to use metallic vessels which could communicate any injurious matter to the extracts.

Extracts possess various names. Succi inspissata are extracts prepared from the fresh expressed juices of vegetables. The plants must be collected at the proper time, when they are most effective, their juices strained when cold, and evaporated in a gentle manner, either in a water bath, or by being placed on plates in dry air or sun-light. The scum, which consists of albumen, &c., should be removed during this process, and mixed with the extract at the termination of the evaporation. Inspissated juices should possess the consistence of a pill mass, or else they are readily spoiled by the albumen contained in them. Their colour is generally green, arising from the green fecula which they contain. They give with water a turbid solution. Inspissated juices are generally made from narcotic plants, and can be prepared from recently dried plants, by pulverizing them, by extraction of the powder with cold water, and subsequent evaporation, observing the above precaution with reference to the albumen. These inspissated juices should be kept in a dry place to preserve them.

Very powerful narcotic extracts are obtained when these inspissated

juices are digested with alcohol, the spirituous solution filtered, then the alcohol distilled therefrom, and the residue evaporated to the proper consistence. In this way those ingredients which are ineffective, and have only a tendency to spoil the extract, may be removed; and, moreover, these ingredients are always present in extracts in variable quantities, which renders the strength of such extracts uncertain. In Pharmacopœias, therefore, proper directions should be given for the preparation of these alcoholic extracts; but as long as this is not the case the pharmaceutist must not on any account deviate from the old methods of making extracts by the instructions laid down in the Pharmacopœias, as dangerous results might arise from such deviation, unless by the express direction of the prescriber.

When the juices of fruits are evaporated to the consistence of honey, in the manner previously described, they are also inspissated juices, although generally known under the name of *rob*, and are much used in France.

Pulps are distinguished from the last preparation by consisting of the soft solid portions of fruits as well as the liquid parts. To produce pulps, fresh juicy fruits, with or without previous expression, are gently boiled with water; if necessary, rubbed through a fine hair seive; and the resulting mass evaporated to the consistence of a soft extract. When dried fruits are employed, they must for some time be boiled in water before being rubbed through a sieve. Many fruits, such as the tamarind, contain much free acid, consequently they must not be heated in iron or copper vessels, but in pure tin or earthenware vessels. Generally a portion of sugar is added to pulps for their preservation.

In the narrow sense of the word, all substances obtained by decocting roots, flowers, barks, and other vegetable matter, and evaporating the decoctions thus obtained, to deprive them of their fluid portions, are called extracts, which are divided into watery, spirituous, ethereal, hot and cold, and simple and compound extracts.

Cold aqueous extracts were formerly prepared by macerating finely powdered substances in sixteen times their weight of cold water, from one to two days, with frequent agitation. The expressed and filtered liquid was evaporated in a water bath; again filtered, if rendered turbid by this process, and at last evaporated by a gentle heat to dryness. At present, watery extracts are made by exhausting substances with cold water in Real's press. With many bodies it is a matter of indifference whether these extracts are manufactured by cold infusion or decoction; but with some—as, for example, extract of bark—it is more than probable that the extract from the decoction is the most potent.

Spirituous extracts are prepared by the same process; except for economical reasons, the spirit should be evaporated in a distillatory apparatus to recover it.

Evaporation should be conducted in a moderate heat, and the fluid kept in continual motion in a current of air, by which means the operation is much quickened.

The consistence to which extracts should be evaporated is various. Most extracts from dry roots, barks, and herbs, should be evaporated to the thickness of common turpentine. In consequence of extracts being

thinner when hot than when cold, it is necessary from time to time during their evaporation, to place a small portion on a piece of cold metal to ascertain if the desired consistence has been arrived at. When extracts are only evaporated to the consistence of a syrup, they are denominated fluid extracts. These extracts are generally prepared from fresh roots and herbs, but may also with advantage be made from dry materials, and require about one-eighth of their bulk of alcohol to preserve them.

Extracts belong to the most important class of pharmaceutical preparations, because they contain in the smallest bulk the active parts of plants. But as those active principles are liable to be injured during the process of evaporation, the greatest care is required to prevent this result. Different modifications in the processes for making extracts depend upon the nature of the active principles which plants contain, and with which it is necessary to be well acquainted to carry out the necessary modifications. A well prepared extract should possess in the highest degree the odour, and particularly the taste, of the plant from which it was made. It should be without empyreumatic odour or taste. It must be homogeneous, and have the proper consistence. When dissolved in water, it should not be turbid from woody fibre or anything else, except from the presence of chlorophyll, albumen, and resinous matter, which have been dissolved in the process of extraction. Injurious metallic contaminations are detected by burning the extract and examining its ash with the usual reagents.

Resinous extracts are prepared in a similar manner, except that alcohol is always applied as the extracting medium. Sometimes it is advisable to macerate the substance first with water, then to dry and pulverize it, by which means it is more readily acted upon by the alcohol. These resinous extracts, or pure resins, should be entirely soluble in alcohol, but quite insoluble in water.

THE FORMATION OF ORGANIC COMPOUNDS.

No. II.

BY DR. CHARLES LÖWIG.

Only in a few cases decomposition takes place in organic compounds when they are in a chemically pure condition. Should this result follow, it must be due to some external influence. Either the existing elements only of the compound take part in its decomposition, or it happens with the co-operation of matters, which are brought in contact with the organic compound, by their affinities to the constituents of its radical, and which induce a decomposition of the radical with the formation of new compounds. Consequently, either the influencing body does not enter the new compound, or it does, and causes the formation of a derived radical, mostly through substitution. The decomposition of organic compounds, without the co-operation of chemically reacting bodies, proceeds—firstly, from electric influence; secondly, from the influence of heat; thirdly, from fermentation and putrefaction; and fourthly, from the vital power of the animal organismus. When in the decomposition, chemically influencing matters (for example, oxygen)

also contemporaneously take part, then the number of new compounds is thereby increased, and oftentimes the decomposition terminates in the complete destruction of the organic compound. As chemically reacting bodies, are to be reckoned, besides oxygen, the salifiers, sulphur, strong inorganic acids and bases, ammonia, and the strong positive metals. Because organic compounds cannot be produced by the direct combination of their elements, they must be only products of decomposition, and as such their constitution distinguishes them. Therefore, as this distinction is the highest scientific aim of organic chemistry, so it proves that one of its chief problems consists in examining, in the most exact manner, the products into which an organic body is resolved through the above-named influences, and ascertaining whether the appearances of the resulting bodies are homogeneous or not; and also, whether their composition is similar, or the reverse.

A disunion of the elements of an organic body often takes place through electrical influences, in such a manner that new and less complex radicals and compounds are formed, with the evolution of carbonic acid and hydrogen. For example, when the current from a six-paired zinc and charcoal battery, the electrodes of which are platina, is passed through a highly concentrated solution of valerianate of potash, there results carbonic acid, hydrogen, a carbohydrogen, consisting of $C_8 H_8$, and an oily stratum, whose chief constituent is valyl, $C_8 H_9$. The hydrate of valerianic acid, H O, $C_{10} H_9 O_3$, is resolved thereby into $C_8 H_9 + 2 C O_2 + H$. In the same manner, butyric acid, H O, $C_8 H_7 O$, is broken into $C_6 H_7 + 2 C O_2 + H$, and acetic acid, H O, $C_4 H_3 O_3$, into $C_2 H_3$, or $(C_4 H_5) H + 2 C O_2$ and H.

A great number of organic compounds pass over into the gaseous condition, by certain temperatures, without decomposition ensuing, and can be obtained again in their original condition, by condensation of their vapour; on the contrary, others cannot be volatilized unchanged, but are decomposed into new products by determined temperatures. However, the volatility of organic substances is only practicable at certain temperatures. Many possess the capability of being volatilized without decomposition only up to their boiling points, and their decomposition commences when they are heated a few degrees beyond those points; still, many, the boiling points of which are very high, are so far converted, during boiling, into new compounds, that only a small portion of them volatilizes unchanged; whilst others, whose boiling points are very low, can often be heated much higher than these points, without any change resulting in their constitution. All organic compounds, be they volatile or not, are decomposed by certain temperatures when excluded from the air and heated up to high temperatures, which differ for various bodies. This kind of analysis, which scarcely one organic body can resist, is known under the general name of destructive distillation.

The volatility or non-volatility of organic substances depends, as is principally shown by the chemico-physical properties of organic compounds, upon their elementary composition, and the order to which they belong. In general, it is admitted that hydrogen promotes volatility

and carbon diminishes it; and also, in many cases, oxygen contributes to volatilization, whilst oxygen often hinders it. Compounds which belong to a group, or which stand in the same degree in their composition, diminish in volatility in proportion as the number of individual atoms increases; thus wood-spirit, C_2 H_4 O_2, boils at 140° Fahr.; alcohol, C_4 H_6 O_2, at 172°, and fusel oil, C_{10} H_{12} O_2, at 271°. Most compounds of a higher order are not volatile, as for example, the principal constituents of plants and animals, many organic acids, the conjugate bases, &c.

Heat effects the decomposition of organic compounds,—first, because it strives to form with them gaseous compounds, and therefore causes a transposition of the constituents in non-volatile or difficultly volatile substances, in such a way, that more or less readily volatile compounds become formed; secondly, because it endeavours to destroy, by developing original affinities, the chemical relations of the radical to the bodies with which it is combined.

The products are various which are formed by this decomposing influence of heat, according to the composition of the organic substance, and according to the intensity of the heat to which it is subjected.

Compounds, which consist entirely of carbon and hydrogen in a small number of atoms, are mostly gaseous by ordinary temperatures. The more complex are either fluid or solid. When the latter are exposed to the lowest temperature which is necessary for their decomposition, they are resolved into less complex, and chiefly fluid compounds, by which, however, no change ensues in the absolute proportion of their carbon and hydrogen atoms. When they are more strongly heated, a division of their elements frequently takes place, in such a manner that compounds of simple constitution, and rich in hydrogen, pass off, whilst those which are rich in carbon remain behind. But when these compounds are exposed suddenly to a brisk red heat, a separation of charcoal always takes place, accompanied with the evolution of simply constituted gases, rich in hydrogen, as C_2 H_4 and C_2 H_2. The products which are formed at low temperatures also undergo a similar decomposition when they are suddenly subjected to an intense heat, with always the separation of hydrogen. Thus C_4 H_4 is decomposed, according to the temperature, into C_2 H_4 and H_2, or into C_2 and H_4. When oxygenated organic bodies are exposed to the influence of heat, the original affinity of the oxygen, besides the just-named circumstances, comes into operation on the elements of the radical. The simpler the constitution of this compound is, the simpler are the products of its decomposition when the temperature is slowly raised to the point at which its decomposition commences; and as long as the body remains constant at this temperature, so long will it give off products only obtainable at that temperature. For example, meconic acid, C_7 H_2 O_7, breaks up at 392° Fahr. into comenic acid, C_6 H_2 O_5, and C O_2, and this, by a higher temperature, into pyromeconic acid, C_5 H_2 O_3, and C O_2. By the first influence, compounds more rich in oxygen arise; but as oxygen is always expelled under the form of carbonic acid or water, or both together, so new and cotemporaneous volatile compounds are formed, which pass off, and thus are withdrawn from the

further influence of the heat. Volatile organic acids combined with bases, are in an equal manner decomposed by heat, as those which are not volatile; two atoms of acetic acid, $C_8\ H_6\ O_6$, are thus broken up into aceton, $C_6\ H_6\ O_2$, and $2\ C\ O_2$.

The hydrate of benzoic acid, $C_{14}\ H_6\ O_4$, with hydrate of lime, is decomposed by heat into benzine, $C_{12}\ H_6$, and $2\ C\ O_2$. Camphor, $C_{10}\ H_8\ O$, gives, by distillation with anhydrous phosphoric acid, camphine, $C_9\ H_7$, and $H\ O$. Two atoms of mucic acid, $C_{12}\ H_8\ O_{14}$, are resolved by heat into pyromucic acid, $C_{10}\ H_{15}\ O_5$, and $2\ C\ O_2$, and $3\ H\ O$. Acetone, as well as pyromucic acid, contains a greater quantity of carbon atoms than acetic acid and mucic acid. Now acetone is a compound properly represented by the formula, $C_2\ H_3\ (C_4\ H_3)\ O_2$, and pyromucic acid, by the formula, $C_4\ H\ (C_8\ H_4)\ O_5$, as will be hereafter shown.

Seldom the case happens that compounds of complex constitutions are the results of decomposition by heat. These compounds, however, form, when they are exposed suddenly to a glowing heat, a great number of new products, under the continued evolution of gases. The connection between original substances, and the products of their decomposition, is principally and further developed in the specific grouping of the organic radicals and their combinations. We shall mention here shortly the phenomena which we have observed as peculiar to dry distillation.

When non-volatile compounds of a high order, such as gum, woody fibre, and sugar, are exposed in a distillatory apparatus to a continually increasing heat, those which melt at high temperatures first become fluid, and then boil. The unmeltable ones, as wood, on which most researches have been made, become coloured brown, and manifest a peculiar disagreeable odour. From the beginning to the end of the operation, gaseous products pass off, which are continually changing. Bodies which are rich in oxygen, as gum, wood, &c., evolve, at the commencement of the operation, much carbonic acid, and, later, carbonic oxide. In consequence of the action of the oxygen on the radicals, and the oxidation of a portion of the existing carbon atoms, new radicals are formed, which either pass off by themselves, or combine with the yet remaining oxygen, to form volatile oxides. In proportion as carbonic acid and carbonic oxide escape, gases are evolved, which consist of carbon and hydrogen; these are, when derived from wood and analogous substances, poor in olefiant gas, $C_4\ H_4$, but contain other gases, which absorb chlorine and much marsh gas, $C_2\ H_4$. When the temperature is raised still higher, the oxygen is almost entirely dissipated; and then new compounds distil over, which contain no, or very little, oxygen. When the sides of the apparatus become extremely hot, the gases rich in carbon are first decomposed into carbon and marsh gas; and at last this also is resolved into carbon and hydrogen.

Compounds, poor in oxygen and rich in hydrogen,—as fats, resins, and volatile products, which, besides gases, are formed by dry distillation,—are completely and instantaneously decomposed, when dropped into red-hot cylinders filled with stones. The gases are rich in carbon which are evolved when the apparatus is only slightly red hot. They

burn with a bright flame, and therefore bad sorts of oil, pitch, and tar, are used in this way for gas illumination; and also the gas which is obtained by the dry distillation of coal, when it is not prepared by too high a temperature, is rich in carbon. Should, however, the heat be very high, approaching a white heat, the first formed gases are decomposed into carbon and hydrogen.

Contemporaneously with the formation of gaseous products from bodies rich in oxygen, an almost colourless fluid passes over at first, which is nearly all water, and afterwards becomes coloured yellow, under the formation of a dense smoke. By elevating the temperature, an oily fluid appears, which becomes constantly thicker and darker, and at last appears almost black; and, on account of its consistence, can scarcely run down the sides of the apparatus.

The fluid compounds which, besides water, are formed at the commencement of dry distillation, and found dissolved in the water, contain oxygen, and are volatile. They consist chiefly of acetic acid, wood-spirit, acetate of methyl, oxide, xylit, mesit, &c. The brown, stinking, oily, and tarry distillate, which comes over afterwards, is a mixture of compounds rich in carbon and hydrogen, in which are to be found creosote, kapnamor, picamar, &c. From bodies poor in oxygen, as by the distillation of resins, coal, and oils, are formed equally interesting products, consisting of carbon and hydrogen, as spirol, naphtalin, retinyl, and retinaphta. The process is finished when no more gases and fluid products are evolved, and the residue is carbon, which has the appearance of a black mass, more or less porous.

When the body is unmeltable, either before or during decomposition, as woods, the resulting charcoal has the form of the substance from which it was obtained. In opposite cases, it appears as a swollen, spongy mass, like the charcoal which is obtained by the dry distillation of sugar. When the vapour of volatile compounds, rich in hydrogen, is conducted through white-hot tubes, the charcoal separates in the condition of a fine powder. On the large scale particularly, wood, coal, and turf, are used for the manufacture of charcoal. The produce of charcoal from wood is greater, the more the oxygen combines with the hydrogen, the more free the wood is from hygroscopic water before its combustion, and the slower the distillation is conducted. By slow carbonization, the produce from air-dried wood, that still contains from 16 to 20 per cent. of water, amounts to between 25 and 27 per cent.; and by a rapid heating, seldom more than 15 per cent. is obtained. In the latter case, any portions of the wood which lie near to the walls of the distillatory apparatus, are already decomposed; and the charcoal of those parts existing in glowing condition; whilst that which lies in the middle has only reached the temperature at which the hygroscopic water is expelled. The watery vapour which forms is now decomposed by the red-hot charcoal, and thereby a portion of the charcoal is separated as carbonic oxide.

All compounds containing nitrogen, and at the same time hydrogen, give ammonia by dry distillation. Through the decomposition of indifferent bodies of this class having large atomic weights, as albumen, fibrin, horns, hoofs, &c., essentially the same phenomena take place as

by the dry distillation of substances free from nitrogen. When this decomposition proceeds without the co-operation of foreign bodies, a considerable quantity of carbonate of ammonia is always formed at the beginning of the operation, besides volatile organic bases which agree in their chemical relations with ammonia. As a residue, a not unimportant quantity of a very porous charcoal, containing nitrogen, remains, because all these substances melt at high temperatures.

When these substances are mixed with strong bases, as potash, and subjected to dry distillation, and the heat towards the end of the operation raised to a strong redness, a metallic cyanide K, N C_2, is formed. All the nitrogen contained in this body is evolved as ammonia, when it is heated to redness, with an excess of hydrate of potash.

It follows, because the oxygen atoms of organic compounds are not sufficient to the complete oxidation of the carbon and hydrogen atoms of radicals, that when such an oxidation shall be effected, the deficient oxygen must be derived from external sources. The fewer the individual atoms of carbon and hydrogen which are present in radicals, and the more they are combined with oxygen atoms, the less oxygen is necessary, from external sources, for the complete oxidation or combustion of these compounds. The products of this complete combustion can only be carbonic acid and water. Should the compound contain nitrogen, it is evolved in a gaseous form. The more complex the organic radical is, and the fewer the oxygen atoms are which are combined with it, the less can a contemporaneous combustion of all the carbon and hydrogen atoms ensue. In most cases, therefore, the phenomena of dry distillation precede the combustion. Only the surface of the substance comes in contact with the oxygen by the combustion of such compounds. The inner parts of them present, at the same moment, no combustion but by the heat of the burning portions, as in a retort they become subject to dry distillation; for now the products of distillation break forth from the interior of the substance, and come in contact with the air, whilst in a red-hot condition, which causes them to ignite and form a flame. Through the combustion of these volatile products, the oxygen of the air is absorbed, and thereby its admission is prevented to the separated charcoal. This burns only when no more volatile bodies escape.

When the products of distillation find sufficient oxygen, which is the case when there is a strong draught of air, they become completely turned into carbonic acid and water. In most furnace arrangements the draught of air is not quick enough; consequently a portion of the products of distillation is carried beyond the flame, surrounded by nitrogen, carbonic acid, and water, in a gaseous state. These unburnt products condense in the cold air, and form the smoke which is deposited as soot in the canals through which the draught passes.

In the same manner as oxygen can be employed for complete oxidation, so can inorganic oxides, which readily give up their oxygen, as nitric and chromic acids and their salts, and all those inorganic compounds in which the oxygen is not retained by a strong affinity. Indeed, even oxides which, heated alone, evolve no oxygen, as oxide of copper, are reduced when they are mixed with a sufficient quantity of organic

matter, and exposed to a high temperature under the formation of carbonic acid and water. Upon these facts are based the *principle of organic elementary analysis.*

FACTS AND DISCOVERIES IN SCIENCE.

Mixtures, or other Medicinal Preparations, containing Gum-resins.—The gum-resins, such as myrrh, ammoniacum, assafœtida, and others, may be successfully suspended in mixtures and other preparations by means of the following easy and simple process. On adding six or eight drops of pure sweet-almond oil to a very small quantity of the gum-resin employed, it forms into a mass, by trituration in a mortar; and when the oil and gum-resin have become thoroughly incorporated together, the result is a smooth paste, to which the vehicle, in which it is intended the gum-resin shall be administered, is to be added very gradually. By this means, an emulsion is prepared in a very speedy manner. This method of preparing emulsions with the gum-resins admits of the mixture being heated, if necessary, without causing the least coagulation; whereas emulsions prepared by means of the yolk of egg will not allow of the application of heat, without more or less coagulating; an advantage, of which both the pharmaceutist and the physician will on all occasions gladly avail themselves.

Ioduretted Oil.—M. Guibourt has recently brought up the report of a committee, appointed by the Academy of Sciences in Paris, to determine to what extent a definite combination of oil and iodine might be employed advantageously as a therapeutic agent. Passing over so much of the report in question as refers exclusively to the medicinal action of the compound of oil and iodine, which would find a more appropriate place in a journal devoted to medicine rather than to pharmacy, I would merely direct attention to so much of it as may be interesting to pharmaceutists.

"M. Marchel first proposed the employment of this compound in 1848, with the idea that iodine was the active ingredient in cod-liver oil, and that a preparation containing a large proportion of iodine would be advantageous. Since then, MM. Personne and Deschamps have each proposed formulæ for its preparation. The former believes that, although the proportion of iodine in cod-liver oil is very small, yet that it is a very important ingredient; and, without expecting in all places to replace cod-liver oil, he believes that a larger proportion of iodine, combined with some suitable substance, may prove a highly valuable medicinal agent. According to his plan of procedure, five parts of iodine are dissolved in one thousand parts of oil of sweet almonds, and a jet of aqueous vapour is made to pass through the mixture until quite deprived of colour. Five more parts of iodine are now added, and again decolorized. No traces of vapour of iodine are perceived; but the vapour of the water which is condensed exhales evident traces of the presence of hydriodic acid. The oil is washed with a weak alkaline solution as long as any acid reaction appears, and is then filtered. By adding successive quantities of iodine, double the quantity may be combined; but it is then difficult to avoid obtaining a

high-coloured liquid. By this means an oil can be produced, which differs but little in taste or appearance from oil of sweet almonds, so that it can be given to patients alone or in an emulsion. M. Deschamps produces an ioduretted oil by means of alcohol; but the committee consider it as not in the least superior to that more easily prepared by the method recommended by M. Personne."

Saccharated Medicinal Powders.—Some of the most useful of our pharmaceutical preparations are those known as tinctures, which hold in solution many of the most active principles of vegetable substances. Yet as alcohol, either pure, or more or less diluted with water, constitutes the greater part of their composition, the frequent administration of this substance is, occasionally, very much open to serious objections, both on the part of the physician and his patients. For this reason Dr. Becker recommends the employment of saccharated medicinal powders as substitutes for tinctures, whenever the latter may be considered objectionable. He directs equal proportions of the tinctures of hellebore, cinchona, hyoscyamus, or of other vegetables, as the case may be, and sugar, to be well mixed together, and then evaporated so as to drive of the alcohol, and then to administer the residue instead of the tincture. To this residue he gives the name helleborus saccharatus, hyoscyamus saccharatus, cinchona saccharata, &c. &c., according to the drug made use of.

This mode of preparation of medical substances has evidently attracted the attention of some of the medical authorities of our own country, for in reference to this subject the editor of one of the medical journals makes the following practical observation:—"Supposing the unimpaired medical properties of the tinctures can be thus fixed in these powders (which is problematical), this mode of administration would prove a great boon to physician and patient. Not only is alcohol obviously mischievous in many cases wherein the active principles, of which it is the vehicle, are indicated; but in others, in which such contra-indication is not so apparent, it has often proved a means of inducing a habit of dram-drinking, which prevails even among respectable females to a far greater extent than is usually supposed."

Datura Fastuosa.—The Datura stramonium has long enjoyed a reputation as a specific against asthma, administered in the form of powder, extract, or tincture, and its stalks and leaves have been recommended to be smoked in a pipe in the same manner as tobacco.

The Datura fastuosa has been lately made use of in the form of tincture, of which from thirty to forty drops have been taken every four hours. The decoction of the bark of this plant has also been lately introduced into medical practice.

Carbonic Acid Gas.—Professor Saloman, a lecturer in one of the universities in the United States of America, has applied, with success, the power of carbonic acid gas as a substitute for steam in the propulsion of engineering machines of various kinds. The astonishing power of this gas has been long known to chemical experimenters, but hitherto their inability to control and regulate its action has prevented its employment as a propelling agent. Professor Saloman asserts

that he is able to control and regulate its action with the utmost safety, and states that this gas will yield a propelling power equal to steam in $\frac{1}{50}$th of the space, and $\frac{1}{100}$th proportion of the ordinary expense. Experiments made in public with this gas are said to have been entirely satisfactory.

Vulcanized India-rubber.—A short time back a gentleman of New York discovered that caoutchouc or India-rubber was capable of uniting with sulphur, and that the compound produced was permanently elastic, supple, or flexible, at a low temperature, whilst unalterable at a temperature much higher than that of boiling water, and at the same time insoluble in the various solvents of ordinary India-rubber. It appears from recent investigations, that caoutchouc or India-rubber possesses the property not only of uniting with a small proportion of sulphur, but also with various other compounds of sulphur, such as the sulphites or hyposulphites of lead, zinc, &c. &c., and may thus undergo the process of vulcanization, as it has been termed. The application of a temperature ranging from 275° to 230° Fahr., to the India-rubber and sulphur, or sulphur compounds, is necessary to effect this remarkable change in this substance. In addition to the above method, there are processes of vulcanization without application of an elevated temperature; one of these consists in plunging the India-rubber into a mixture of sulphuret of carbon and protochloride of sulphur, rapidly withdrawing and washing it with water. Another process consists in macerating the India-rubber for two or three hours in a solution of persulphuret of potassium in a close vessel, and afterwards washing it, first in an alkaline solution, and subsequently in water. In this latter process, however, the application of a temperature of 284° is necessary to produce the required alteration in the India-rubber.

Gas from Wood.—In countries where wood is very abundant, and more easily obtained than coal, it may be used for the production of gas of highly illuminating power, by means of distillation. In Norway and Sweden, where wood is so abundant, that gas obtained from it is cheaper than that obtained from coal, it is likely to be of general utility for social and domestic purposes, as coal-gas is with us; and it is less objectionable on many accounts than the latter, as it does not contain the compounds of sulphur always present, more or less abundantly, in coal-gas.

ON THE SEPARATION OF COPPER BY MEANS OF AMMONIA.

BY M. GERMAIN BARRUEL.

At the same sitting of the Paris Academy of Sciences, M. Despretz gave the following account of this process. The problem proposed by M. Barruel, was to extract from grey copper ore (sulphuret of copper), however complex its composition might be, the whole of the copper, and nothing but the copper, without roasting the ore, leaving also all other mineral substances behind.

Guided by the great affinity of copper for oxygen in the presence of ammonia, M. Barruel attempted the employment of this reagent; the most complete success attended the experiment. The ore having been ground, was placed with a weak solution of ammonia in a bottle capable of containing also the quantity of air requisite to supply the copper with the oxygen necessary for its oxidation; the bottle being then perfectly closed, its contents were agitated for a few minutes.

The blue colour produced by the action of ammonia on copper instantaneously appeared, and the absorbed oxygen produced a vacuum, as was readily ascertained by the influx of the air on reversing the bottle and partially withdrawing the stopper. On driving off, a deposit of oxide of copper was left behind. The problem was thus theoretically resolved; it remained, however, to make sure that the other metals, as zinc, cobalt, nickel, and silver (which might be contained in the ore, and the oxides of which are equally soluble in ammonia), do not act in the same way as copper. To decide this point, M. Barruel treated in the same manner the sulphurets and arsenical sulphurets of these metals. In each case, nothing but copper was taken up. To insure the entire efficacy of the reaction of this reagent, M. Barruel treated the residue with prussiate of potash, when no trace of red colour was perceptible; the problem was thus completely resolved, as a laboratory experiment.

As to the commercial application of the process, it only remains to say that, having determined by direct experiment the proportion of ammonia necessary to the operation, M. Barruel found that exactly one equivalent of ammonia is requisite for one of copper. As oxidation on the large scale would be produced by means of a current of air blown slowly through the liquid in which the ground ore is kept in suspension, M. Barruel endeavoured to ascertain the quantity of air required for producing this result, and found that one kilogramme of copper requires 833 cubic decimetres of air. The operation should not be allowed to proceed too rapidly, lest, on the rise of temperature, a great portion of the ammonia should be driven off. This inconvenience cannot be entirely avoided, though it may be obviated by such an arrangement of the apparatus as would insure the recovery of the ammonia for use in succeeding operations.

The cupro-ammoniacal solution, separated from the rest of the ore, is then submitted to distillation, with a view to recover the ammonia for use in future operations, the oxide of copper being left behind in the form of black, brilliant, micacious plates, whence metallic copper may be obtained in the usual way. M. Barruel has completely succeeded in employing putrid urine in place of ammonia.

ON CHEMICAL SYMBOLS AND FORMULÆ.

We know from experience that the most repulsive objects which the self-taught student of chemistry has to encounter, are those mysterious signs contained in most modern works of chemistry; but at the same time we are convinced, that when comprehended, nothing contributes

so much to an acquirement of a thorough knowledge of this science as these symbols and formulæ; for, besides assisting the memory, they express to the mind's eye, in a few letters and figures, that which would require in ordinary language oftentimes pages to tell, and be even then less clear and intelligible than when written in symbolic characters.

As it is one of the purposes of this journal to diffuse elementary knowledge, we shall endeavour, at the request of several correspondents, to render this matter somewhat more simple and evident than it is in many educational works on chemistry.

Symbols are used to denote the names of elements and compounds, and the proportionate quantities in which these chemical substances are combined. Thus, S, which is the initial letter of sulphur, represents that element, and means, when written, not only sulphur but sixteen parts by weight of that substance. In the same manner, O means oxygen, and eight parts by weight of that gas, which is the proportion in which it combines with other bodies. Consequently, when we see these two symbols written side by side thus, S O, or S+O, they express hyposulphurous acid, or a definite compound of oxygen and sulphur, consisting of eight parts by weight of the former, and sixteen parts by weight of the latter. Sometimes the initial letter of the Latin or ancient name of the element is employed for the symbol. When the initial letter of a name has been already employed to denote one element, as C for carbon, and the name of another begins with C, then another letter is added to it, as Cl for chlorine, to distinguish between the two symbols. When there is attached to any of the symbols a numeral, thus, S^2, or S_2, it implies twice the combining weight or equivalent of the substance denoted by the symbol, as in this example it means twice sixteen parts, or thirty-two parts by weight of sulphur.

Sulphuric acid is represented by the formula $S\ O_3$, which, at the same time expresses its composition, which is S, or one equivalent, or sixteen parts by weight of sulphur, and O_3, or three equivalents, or twenty-four parts by weight of oxygen. As this system of chemical annotation is uniformly applied to all the elementary substances and their combinations, it is unnecessary to repeat these examples, as from one example clearly understood the whole system becomes intelligible.

To give an instance where the value of these symbols is very evident, we shall put in the form of an equation the change which takes place when grape sugar is converted into alcohol, thus, $C_{12}\ H_{14}\ O_{14} = 2\ (C_4\ H_6\ O_2) + 4\ C\ O_2 + 2\ H\ O$. Here, grape sugar is represented by its composition, namely, C_{12}, or seventy-two parts by weight, or 12 equivalents of carbon; H_{14}, or fourteen equivalents, or fourteen parts by weight of hydrogen; and O_{14}, or fourteen equivalents, or 112 parts by weight of oxygen. The equivalent weights of carbon, hydrogen, and oxygen, are, respectively, six, one, and eight; and these equivalent weights, multiplied by the number of equivalents of each substance, give the proportionate weight of each substance in the compound.

We have expressed, in these three letters and six figures, what may be seen and comprehended at a glance, and that which requires more than ten times the space to convey the same idea in ordinary language. To return

to the equation; this equivalent of grape sugar is equal, or is resolved into two equivalents of alcohol, four equivalents of carbonic acid, and two equivalents of water. The formula in the parenthesis is that of one equivalent of alcohol; and the reason that it is thus parenthetically written, is, that it is to be understood by this means that the prefix 2 applies to the entire number of elements contained in the parenthesis. The 4 C O_2 might also have written thus, 4 (C O_2), to render it more clear; but, with well-known binary compounds, it is not the practice, or considered necessary, to show in this way that the numeral prefixed to them appertains to all the elements of the compounds. The plus sign (+) is employed generally to show that the bodies between which it is placed, although products as in this case of the decomposition of cane sugar, are not in chemical combination with the annexed bodies.

When a formula gives only the relative proportions of the elements of a compound, it is an empirical formula; but when it expresses the internal constitution of a body, it is termed a rational one. Thus, the empirical formula for sulphate of potash is, K S O_4; on the contrary, the rational one is, K O, S O_3. There are many evidences to show that K O, or potash, or oxide of potassium, is in combination with S O_3, or sulphuric acid, and not S O_4, an unknown body in combination with K, or potassium; and also that K S is not in combination with O_4.

In the case particularly of organic compounds, students are often puzzled to ascertain the reason why, for example, grape sugar should be expressed by the formula C_{12} H_{14} O_{14}, and not by half or twice those numbers as C_6 H_7 O_7, or C_{24} H_{28} O_{28}, which equally well represent its composition. Generally these numbers are determined by the proportion in which compounds combine with other bodies; and, therefore, their formula expresses not only their constitution, but also their combining weight or equivalent. There are, however, substances which do not form definite combinations with any other bodies. The formula for these is expressed in the lowest whole numbers of equivalents nearest to their composition, as shown by ultimate analysis.

ON THE FORMATION OF ETHER BY THE ACTION OF METALLIC CHLORIDES ON ALCOHOL.

BY M. BERTHELOT, OF THE COLLEGE OF FRANCE.

M. Magnus some time since endeavoured to etherify alcohol by means of chloride of calcium, at 240° C., but without success. M. Berthelot has, however, succeeded in this experiment by acting on absolute alcohol, in a close vessel, with a pure and crystalline chloride; ether was found at 300° C., and at 340° C., ether and olefiant gas passed over, and this without the chloride undergoing any alteration.

Chloride of strontium produces the same effect, but less energetically. Water, chlorides of barium, and of the alkaline metals, iodide and bromide of potassium, appear to possess no etherfying action, even at a temperature of 360° C.

THE PHARMACY BILL.

Lest our pharmaceutical readers should think that we have been hoaxing them respecting that brilliant emanation of human genius, yclept the Pharmacy Bill, which is now the law of the land, we publish it entire in the present number of this journal, so that they may form an unbiassed judgment upon its extraordinary merits, and the labour of body and mind that those must have undergone who have brought such a measure to maturity. The labours of Hercules sink into insignificance in comparison with theirs. Its authors deserve civic crowns. Their names and deeds should be perpetuated on monumental brass, and a mummy enrolled in honour of the occasion.

In this expression of our excess of joy and gratitude for this act, we have forgotten the feelings of its authors, "men who do good by stealth, and blush to find it fame." Such an ovation as we have suggested would be more painful to them than an hour's exercise in the pillory, or having to provide for a dependent, or old friend, by making an office in the Pharmaceutical Society which is not required, and by appointing a person totally disqualified for it.

To drop this ironical strain, we do not hesitate to assert that the objects which the authors of this Act had in view, in carrying it through Parliament, will entirely fail. They knew that the Society was fast hastening to decay, in consequence of the members receiving scarcely any return for their subscriptions, which were spent in an indecent manner, to provide berths, some of which were sinecures, for men who were waiters on Providence, and jackals to the lions of this Society. Such being the case, it became necessary to frighten the chemists into a desire to contribute to the Society, because these jackals could no longer exist when the funds were gone; therefore, a bill of any shape or character must be had, it mattered not what, so long as it was a bill, for there is something terrible even in the name of a bill, to say nothing about its penal clauses, its power of conferring honours, and its prospective advantages looming in the distance.

The Bill has been obtained, and we think that its promoters will find that they have reckoned too much on the gullibility of the pharmaceutists of this country. They will find, unless they filch our plans for the improvement of this Society, by which at least an equivalent would be returned to the members, the Society must continue to sink until death shall release it from its sufferings. The policy must no longer be to try to provide sinecures and salaries for officials under various guises and shams, but to reduce or abolish the annual subscription, to get rid of the drones, and to show to the members that their interests are really consulted.

In truth, if we read the Bill aright, this consummation will arrive sooner than could have been expected, for by what appears to us an oversight in the Bill, there is no provision made for the payment of further subscriptions by those who are at present members and associates of this Society, as the Bill declares, by the sixth clause, that "all such persons as shall, at the time of passing of this Act, be members, associates, apprentices, or students, of the said Pharmaceutical Society of Great Britain, according to the terms of the said charter of incorporation, shall be registered as pharmaceutical chemists, assistants, and apprentices, or students, respectively."

There being no other saving clause, this one manifestly declares that all shall be and remain thus connected with the Society; consequently, the members and others at present belonging to it, may do as they please about paying for the honour and privilege they enjoy. We present gratuitously this point to the notice of the framers of this Bill, and leave it to their ingenuity to explain it away, or suggest a remedy. Should our interpretation of this clause prove the correct one, we are inclined to believe that such a stoppage of the supplies, as must necessarily arise from it, would be the greatest good fortune that could befall the Pharmaceutical Society, as it would rid it of those men whose attachment to the Society consists in their power to deplete it.

We are told by those who are naturally desirous of making the best of a bad job, that the Pharmacy Act confers an honorary distinction on the members of this Society. That it confers a titular distinction is evident, but the honour connected with it is far from apparent. In fact, we know that the metropolitan pharmaceutists in general do not consider it an honour or profit to be members of this Society; for a great many have withdrawn from it, and a considerable number of those who still subscribe, exhibit no sign, by the diploma, or otherwise, of their connection with it. This state of things has arisen from two causes; one of which is, that the resources of this Society have been mainly devoted to elementary education instead of to the extension of science, whereby no honour has been gained for anybody; whereas, had it been otherwise, the resulting improvements and discoveries in science would have shed a lustre on the Society, and all under its banners. The other cause is that which we have already mentioned, namely, that there is no advantage arising to the members from the influence and character of the Society. All its resources have been swallowed by two or three cormorants. Until the Society has been weeded and placed upon an entirely new basis, a downward course, despite its Act of Parliament, will inevitably mark its career.

THE MODEL SCHOOL OF PHARMACY.

Few persons, acquainted with the natural history of modern public institutions, will credit that there is such a *rara avis* in existence as a pluralist. Those who are curious in these matters may see a living specimen of this genus in the Pharmaceutical Society—a society not yet in its teens. Not a dried and stuffed specimen from the British Museum, but a real living pharmaceutical pluralist; the first and only specimen of pharmaceutical origin in the world, and most probably the last. Reared under the fostering care of the Council of this Society, they are prouder of it than the Zoological Society is of its hippopotamus, or the great Tawmley was of his patent box-iron.

The laboratory of this society is under the direction of a gentleman who, besides holding this office, is its professor of chemistry, its professor of pharmacy, its librarian, curator of its museum, and sub-editor of its so-called Journal. In addition to these offices, he is secretary to the Cavendish Society, and also secretary to the Chemical Society; and undertakes a variety of other duties, too numerous to be mentioned here.

Now, we are not going to denounce this Protean gentleman for accepting offices, to perform which require corporeal ubiquity and mental power equal to three Cæsars, because we can excuse the cupidity of poor human nature; but we must say, that the conduct of the Council who conferred these offices, and tolerates such abuses of the privilege of bestowing appointments, is criminal in the extreme. We can laugh at the man who accepts them, but we must express our disgust with those that allow such pluralities to exist; and above all, to exist in the model school of a model institution.

Need we point out, that any man who holds such a multitude of offices must leave a large portion of the duties of such offices to be performed, if performed at all, by subordinates; and if such subordinates are competent for the duties delegated to them by their superior officer, they ought to receive his emoluments and responsibilities; and further, when a man takes upon himself offices both in and beyond a society, for which he is liberally paid, he ought to remunerate his deputies himself, if he requires their aid by reason of his pluralities. Here, again, the Council is the most culpable of the two parties, for permitting such abuses as these to be perpetrated in the Pharmaceutical Society. In this respect their school is doubtless a model one; and we shall leave our readers to draw the inference as to what description of model we refer to. They will certainly conclude that it is not a model worthy of imitation.

We have now before us in a printed form the heads of the course of synthetical operations through which, it is stated, each pupil in this model laboratory has to pass. We never in our lives read a more ill-digested scheme for conveying a knowledge of practical chemistry to pupils, and

know that nothing half so bad is to be found in any other educational laboratory. Perhaps the Council think it is good enough for pharmaceutical students; or, what is more probable, they take their opinions second-hand from one of their own servants, the director of the laboratory, and believe that this scheme is unparalleled for its efficiency in the whole world, and point to the embryo Liebigs and Faradays which have emanated from their school in proof thereof.

In fact, how can it be otherwise, when, according to these printed heads, we find that the pupils are instructed in the art of making artificial gems. The country may expect to be inundated shortly with Bristol's diamonds from this laboratory; and it is privately whispered about—in confidence, of course—that the Koh-i-noor was manufactured there. We presume this art forms an important feature in the occupation of a pharmaceutical chemist. We also learn from the same authority, that the students are engaged in the manufacture of glass and ultramarine, and we have anxiously examined the financial statement of the Council to discover how much of the precious metals are returned in exchange for these valuable products; but, alas! without being illuminated.

After the student has been initiated into the mysteries of the metals, we find he is instructed in the manufacture of extracts, infusions, spirit of rosemary, essence of ginger, tincture of wormwood, soap cerate, and citrine ointment, &c. &c. Wonderful after-piece to the gems and ultramarine! A malicious critic would say, that the student who requires such instruction as is indicated by these subjects, either must be a monstrously stupid fellow, or he ought to bring an action against the person with whom he was apprenticed to recover damages for having entirely failed to teach him his business. It will readily occur to any of our readers who are conversant with systems of instruction pursued in chemical laboratories, that this course of practical instruction put forth by the Council of the Pharmaceutical Society is a puff and an impudent pretence, disgraceful in a public institution. We will undertake to assert that no student ever went through this course; and if any pretend to do so, the more tardy must be their educational progress. It is worse than imbecility to suppose that chemistry is to be learned as a science by following the scheme of this laboratory; that is, by dooming the student, for an immeasurable time, to manufacture on a small scale all the salts of mercury, by precipitation, sublimation, combustion, &c.; then all the salts of lead; and so on to the end of the chapter.

Either this system is followed, or not. If it be followed, it betrays intolerable ignorance; and if it be not pursued, the printed document, which pretends it is, attempts a gross deception.

Reviews.

THE LONDON DISPENSATORY: *A Practical Synopsis of Materia Medica, Pharmacy, and Therapeutics; illustrated with many useful Tables, and Woodcuts of the Pharmaceutical Apparatus. By the late* ANTHONY TODD THOMPSON, M.D., F.L.S., &c. *Eleventh edition. Edited by* ALFRED BARING GARROD, M.D., &c. London: Longman and Co. 1852.

PERHAPS no other man in his day was so capable of writing a work on materia medica and pharmacy, as the late indefatigable and accomplished Dr. A. T. Thompson, who cultivated, with an exemplary enthusiasm, those sciences connected with the profession of pharmacy, namely, chemistry and botany, as well as the history of drugs and pharmaceutical preparations in general. In fact, during the greater part of his career as an authority on materia medica, "The London Dispensatory" was held in the estimation of the medical and pharmaceutical student as being without a competitor; for during the lifetime of its author it passed through no less than ten editions. If we examine the contemporaneous pharmaceutical literature for the last forty years, we are constrained to admit that this verdict in favour of Dr. Thompson's excellencies as a writer on materia medica was founded on a just appreciation of his merits.

Although we have to repeat the complaint respecting this book, that we have already frequently made against every existing English work on this subject, namely, that it treats much too extensively on therapeutics for the pharmaceutical student, still we regard "The London Dispensatory" as one of the best, if not the best, of the numerous works on materia medica and pharmacy extant, especially for the pharmaceutical chemist. It contains less matter on the application of remedies to diseases than any other work of its size, and therefore gives more attention to the history, botany, and chemistry of drugs and pharmaceutical preparations, which renders it perhaps less adapted for the student of medicine, but certainly more suitable for the student of pharmacy, than any other treatise of equal pretensions.

We have no desire to make invidious distinctions, but we must remark that, for the use of pharmaceutists, we consider Dr. Thompson's "Dispensatory" superior to the larger and more elaborate work of Dr. Pereira, although, for the use of the medical practitioner, doubtless the latter is by far the most appropriate. We will even go further, and express the opinion, that of all living authorities on materia medica, not one is so capable of compiling a treatise on materia medica and pharmacy, especially suitable for pharmaceutical chemists, as Dr. Pereira. We gather this opinion from his "Elements of Materia Medica," the work we have thus partially condemned.

Although produced at a period when there is a much larger number of excellent works on the same subjects, to compete for public favour, than formerly, yet it must be admitted that the new edition of Thompson's "Dispensatory," edited by Dr. A. B. Garrod, deserves the success that has been bestowed on its precursors; for its editor has endeavoured

successfully, by proper emendations in consonance with the present state of science, and without materially altering the arrangement and character of the contents of the previous edition, to carry out the plan of the work as originally designed by Dr. Thompson.

The first part of the "Dispensatory" contains the elements of pharmacy, which consists of a concise account of the laws of affinity, of the action of heat, light, and electricity, of atomic weights and equivalents, and of pharmaceutical operations and apparatus. The second part is devoted to the description of the numerous substances which constitute the materia medica; and the third part treats on the preparations and compounds of the three Pharmacopœias of the United Kingdom. There is also a useful appendix which contains, amongst other matter, some valuable tables of specific gravities, incompatibles, and orders of affinities, &c.

The blemishes of Dr. Garrod's edition are but few; but nevertheless, it is our duty not to pass them over in silence. At page 192, it is stated that chlorinated lime is composed of one equivalent of hypochloride of lime, and one equivalent of chloride of calcium, and makes no mention whatever of the caustic lime which it invariably contains, and which constitutes the insoluble residue when its solution is made. The statement that it contains hypochloride of lime is, unquestionably, a misprint. It should have been written hypochlorite.

We must demur to the following passage, which speaks of suphuric acid, when prepared in the ordinary way.

"Sulphuric acid thus prepared is not perfectly pure, but is united with about three or four per cent. of saline matter, consisting of two-thirds of sulphate of potash and one-third of sulphate of lead." "Both these impurities are precipitated by adding three parts of distilled water to the acid."——Page 98.

Now we can readily understand that the sulphate of lead should be precipitated, because it is not soluble in such a mixture of acid and water; but we do not comprehend how the sulphate of potash is thrown down, when present in such a small quantity, as it is soluble to a much greater extent in this mixture than the quantity indicated by the above per centage.

We find, at page 119, that "the alumina thrown down," from solutions of its salts, "by ammonia or potash is redissolved by an excess of the alkalies." This statement is true as regards potash, but incorrect with reference to ammonia, as no excess of that alkali will redissolve alumina. There is also an error at page 261, where it is observed that quinine is not dissolved by potash, as the contrary is the case.

It is at variance with the experience of the best analysts to assume, as Dr. Garrod does, that carbonate of lead "consists of single equivalents of carbonic acid and protoxide of lead; formula—Pb O, C O_2" (page 558), because all analyses show that it contains water, and that its constitution in general is represented by the formula 2 (Pb O, C O_2) + Pb O, H O.

Again, in the same page, the author remarks that

"Its adulteration with chalk may be discovered by pouring distilled vinegar on the suspected carbonate, and then adding oxalic acid or oxalate of ammonia to the solution; the formation of a precipitate proves the presence of chalk."

When this passage was written, the author must have lost sight of the fact that oxalic acid or its salts will give a precipitate with a solution of acetate of lead; consequently, every sample of carbonate of lead when judged by the above test, however pure, would be pronounced to be adulterated with chalk.

We should have thought that Dr. Garrod, writing in 1852, would have been acquainted with the fact that nitric acid can be obtained anhydrous, as Deville has shown three years since, by passing perfectly dry chlorine over perfectly dry nitrate of silver, in a U-shaped tube; and not have asserted that "the strongest acid which can be isolated, is composed of one equivalent of water, and one of anhydrous acid" (page 754).

He might also have learned, from the journals of pharmacy, a fact which possibly does not come within the range of his professional pursuits to know—that the addition of compound tincture of cardamoms does *not* prevent the spontaneous decomposition of compound decoction of aloes taking place (page 832).

We shall learn for the first time, that the nitrate of bismuth, of the London Pharmacopœia, is soluble in ammonia. This statement must involve some error, for the author or editor, calls ammonia a salt, which leads one to believe he must have been thinking about some other compound when he wrote the following passage:—

"The nitrate or subnitrate of bismuth is a pure, white, inodorous, insipid powder, which consists of minute crystals; sometimes it precipitates in larger crystals. It is *soluble in ammonia* although *this salt* precipitates it from the nitrate."—— Page 928.

There is a typographical error at page 1157, where it is stated that iodo-cyanide of potash and mercury is made from bichloride of mercury, instead of from the bicyanide.

We think that Dr. Garrod will agree with us that we have not reviewed his work without reading it, as is too often the practice with critics; and if our readers only derive a tithe of the pleasure from reading our review, that we have received from reading "The London Dispensatory," for the hundredth time, we shall be amply repaid for our labour in writing it.

Dr. Thompson's "Dispensatory" has been for nearly half a century the "Bible" (if we may use the expression without profanity) of thousands of pharmaceutical chemists; and we have no doubt, under the able editorship of Dr. Garrod, it will long remain so; for verily it is an excellent source of instruction for the young, and a good work of reference for the advanced pharmaceutist.

IMPROVEMENTS IN PHOTOGRAPHY.

MODE OF OBTAINING DIRECT POSITIVE PROOFS UPON GLASS, BY MEANS OF IODIZED COLLODION.

BY M. ADOLPHE MARTIN.

At a recent sitting of the Paris Academy of Sciences, M. Regnault gave the following description of M. Martin's process. The collodion

employed is formed of an ethereal solution of gun cotton, obtained by treating 2 parts of carded cotton with a mixture of 50 parts of nitrate of potash, and 100 of sulphuric acid. The gun cotton, previously well washed and dried, is entirely soluble in a mixture of ten volumes of ether and one volume of alcohol. Further additions of ether and alcohol are made, until the solution is definitely composed of 1 part of gun cotton, 120 of ether, and 60 of alcohol; 1 part of nitrate of silver, converted into iodide (by means of an alkaline iodide, preference being given to iodide of ammonium), and dissolved in 20 parts of alcohol, is then added. The glass plate having had a thin layer of this solution spread over it in the usual manner, is dipped, before the coating has become dry, into a bath, composed of one part of distilled water, one-twelfth of nitrate of silver, and one-twentieth of nitric acid.

The exposure in the camera is continued for a few seconds, in the ordinary manner. The glass plate is next plunged in a bath of sulphate of protoxide of iron, and then carefully washed. Up to this point the impression continues negative; but on plunging it into a bath formed of the double cyanide of silver and potassium, it becomes positive and complete, if the exposure has taken place under favourable conditions.

Nothing now remains but to varnish it with dextrine, dry it, and place it on a black velvet ground. The cyanide bath employed is the same as that made use of by MM. Ruolz and Elkington, but diluted with about three volumes of water. It is composed of 100 parts of water, 25 parts of cyanide of potassium, and 4 parts of nitrate of silver. By carefully following this process, positive proofs are always obtained.

PREPARATION OF PURE SILVER FROM CHLORIDE OF SILVER.

Poggendorf's method of decomposing chloride of silver by galvanic action has been modified by Brunner in the following manner:—

The washed chloride of silver is placed in a dish of silver, platina, or copper, which is covered on the exterior surface with wax, except a small spot at the bottom. The dish is placed where the uncovered spot is on a disc of amalgamated zinc, which is contained in a vessel of clay. Water, slightly acidulated with sulphuric acid, is then poured into this apparatus until the metallic vessel is quite full, and covers its brim. After twenty-four hours the reduction is finished. If a small portion of the chloride of silver remains undecomposed, it may be dissolved out of the metallic powder by means of ammonia, which leaves the silver perfectly pure.

CRYSTALLIZATION OF THE BLOOD.

Sanders has found that the blood taken from the crural vein of the dog, crystallizes; and Lehmann has observed that the blood of the porpoise crystallizes in tetrahedrons; and that of the squirrel, in six-sided tables and prisms. Funke has succeeded in crystallizing the blood of a kitten, in long, purple, four-sided prisms, having previously obtained crystals from the venous blood of the spleen of a horse.

THE BEST MEANS TO PRESERVE LEECHES HEALTHY.

BY GUSTAVUS SCHÜLLER.

The apothecaries in Moldavia are, according to the sanitary laws, compelled to keep constantly a stock of at least 300 healthy and serviceable leeches. But, particularly as the hot summer months are the most prejudicial season for these animals, it often happens that in the time of the greatest need no leeches are to be obtained.

Amongst the various means which have been recommended to keep leeches healthy, and to restore the sick ones, good well-burnt wood charcoal has proved, according to my experience, to be the best, as shown by the following experiment. I washed the charcoal well three or four times with fresh spring water, to separate the adhering ashes, and then laid it while wet, and without breaking it smaller, in a large glass cylinder; put the sick leeches, recently washed, into this cylinder, but did not give them any more water, as enough was to be found in the washed charcoal. The glass was tied over with a piece of linen and placed in a cellar, where for five days the leeches were resigned to their fate.

After this period I found the leeches, to my satisfaction, perfectly well. They were quite in a condition to be used, which was not the case in their sick condition.

For two years I have treated my leeches in this way, and always retained them healthy and serviceable. The number of deaths amongst them has been very small. The only precaution I observe is to place all my leeches for eight days in summer on recently washed charcoal, and for two weeks in winter. The method is a cheap one, and one easy of execution.——*Buchner's Repertorium.*

PHOSPHORIC ACID.

To obtain this acid, bones are first calcined to whiteness, then ground and digested in such a quantity of muriatic acid as will serve to dissolve out the carbonate of lime only; the residue is then washed and dried, and a sufficient quantity of water added to form a thin paste. Sulphuric acid is then added in such proportion as will dissolve about 97 per cent. of the lime of this phosphate. This mixture is well stirred and kept at a temperature of about 90° Fahr., for twenty-four hours, after which it is lixiviated with water, or with the washings after-mentioned. The first product gives a strong solution of phosphoric acid, whilst the subsequent washings are resumed for the lixiviation of fresh batches.

To obtain glacial phosphoric acid, the best plan is to digest finely-ground calcined bones with the requisite proportion of oxalic acid, previously dissolved in water; a solution of phosphoric acid is thus obtained, which, on evaporation, furnishes the glacial acid.

There are many purposes in the arts and manufactures to which this acid is applicable, especially on account of its property of not being decomposed by organic matters; amongst these we may mention the preparations of carmine and other vegetable colours of great delicacy.

In combination with ammonia, phosphoric acid furnishes a very superior preparation for rendering linen, cotton, muslin, &c. &c. incombustible. This phosphate of ammonia may also be applied to render wood incombustible, and thus be made to furnish a great boon to the shipping interest. Superphosphate of alumina is now employed as a substitute for the acetate of lead in sugar refining, whilst its application to this purpose is divested of all danger to the consumer of that important aliment.

In combination with alumina, and a small proportion of boracic acid, phosphoric acid possesses the property of furnishing an extremely beautiful and durable glaze for earthenware, in place of the lead glaze at present used. Its perfectly innocuous character gives to its employment a great advantage over the lead glaze—an advantage still further increase by its power of heightening the lustre and brilliancy of the colours obtained by the application of metallic oxides used in this manufacture.

ELDER FLOWER OINTMENT AND OIL.

BY SEPTIMUS PIESSE.

In the London Pharmacopœia the flowers are directed to be boiled with the lard, in making unguentum sambuci. By this process the odour of the flowers is entirely destroyed, and the ointment acquires an empyreumatic smell from the action of heat on the flowers. To obviate this result, and to make an ointment possessing the pleasant odour of elder flowers, I beg to suggest to the readers of the "Annals" the following process, which I have found effectual.

Melt the lard at the lowest possible temperature at which it assumes the fluid form, and introduce into it as many flowers as the melted lard will cover. Macerate them at the above temperature for twelve hours, and then strain off the lard through a piece of linen, without the least pressure. By this means an ointment will be made, when the lard is cold, which represents that which the College really intend it should be.

The oil of elder flowers requires no heat for its preparation, and is prepared precisely as the ointment, with the exception of the heat; as the only object of its use is to obtain the menstruum in a fluid form, and besides, its employment on any other ground is objectionable, especially as it volatilizes the odorous principle of the flowers.

ON THE COMBINATION OF ARSENIOUS ACID AND ALBUMEN.

To the Editors of the "Annals of Pharmacy and Practical Chemistry."

GENTLEMEN,

Your Protean correspondent, Professor Muspratt, has, I perceive, again entered the field on the Jarndyce *v.* Jarndyce-like question concerning the combination of arsenious acid and albumen; and though he has not a single new fact to bring forward in support of his position, has, with unexampled rashness, ventured to say that he is still convinced of the truth of Liebig's hypothesis, and

the accuracy of his former experiments. I will not occupy your valuable space by again repeating the arguments I have already adduced on this subject, as I feel satisfied that the experiments described in my last paper must have completely dispelled every doubt that might have before existed in your minds, with regard to the question at issue: I cannot refrain, however, from protesting in the strongest terms against the line of argument adopted by my opponent, and his utter disregard of all feelings of propriety, in wilfully misrepresenting facts to suit his own convenience, and in order to bolster up (I adopt his own expression) a miserable cause. I have hitherto merely stated in a plain and straightforward manner the results of my investigations, and my deductions from them: I have been content with defending myself from the attacks of my antagonist; but I am at last compelled unwillingly to adopt a different course, and point out the stratagems and subterfuges that gentleman has resorted to, in order to cover the inaccuracy in his original experiments, and at the same time throw discredit on my own. Such conduct is almost unparalleled in the annals of science, and ought to receive the strictest reprehension. In his first paper, Dr. Muspratt says—"Albumen precipitates arsenious acid from its solution, forming with it a sparingly soluble compound." In the last number of this journal, however, the following paragraph occurs:—"*Does arsenious acid precipitate albumen from its solutions in the cold?* Why this question should have been proposed by Mr. Herapath, I know not; for even if it did not precipitate albumen, surely this is no proof of non-combination? Sulphurous acid dissolves alumina, and does not precipitate it in the cold, although, when heated, precipitation and *firm combination* occurs. Mr. Herapath gives the following in his first experiment:—The transparency of the albuminous solution was not *in the slightest degree affected by the presence of arsenious acid.* I do not know whether my learned opponent is short-sighted; but when I tried the experiment, even under a temperature of 98° Fahr., considerable opaqueness occurred."

Now, in this short paragraph, I am sorry to say, Dr. Muspratt has been guilty of at least two equivocations, and (I had almost written) an untruth. Because, in the first place, though no direct allusion was made in his former assertion to the precipitation of albumen by arsenious acid *in the cold or at a moderate temperature*, it was evidently meant to be inferred; for did combination only take place between the two substances *on boiling*, the fact could not be adduced in support of Liebig's theory, which relates to the action of arsenious acid on the animal organism, of course at a temperature of 98° Fahr. Secondly, the non-formation of a precipitate of sulphite of alumina, under the circumstances alluded to, is owing to the fact that alumina possesses a strong tendency to form a soluble sulphite with an excess of sulphurous acid, and consequently precipitation only occurs after the excess of acid has been dispelled by ebullition; and thirdly and lastly, no opacity does occur on mixing aqueous solutions of arsenious acid and albumen, as you may readily satisfy yourselves, whatever may be the proportions in which those substances are employed.

In a paper that was read before the Chemical Society of London, in 1851, Dr. Muspratt thus describes one of his experiments:—

"I took 0.107 grm. of dissolved arsenious acid," he says, "and 12.67 grms. of the glairy albumen of eggs. They were intimately triturated together for about twenty minutes, coagulated by heat, and evaporated to dryness in a water-bath. The white residue, affused with distilled water and filtered, yielded a filtrate which gave *no deposit* of arsenic on copper by Reinsch's test, nor any stains on porcelain by Marsh's apparatus."

Compare this with the following, which appeared in your last number:—

"I took 0.1 grain of dissolved arsenious acid, and 12.5 grains of the glairy albumen of eggs; they were intimately triturated together in a mortar for about twenty minutes, coagulated by heat, and evaporated to dryness in a water-bath. The residue, affused with cold distilled water, and filtered, yielded a filtrate which gave for a short time *slight deposits of arsenic* on copper, by Reinsch's test."

I must also call your attention to Dr. Muspratt's quantitative analysis of the so-called arsenite of albumen, which was given in the communication to the Chemical Society, before alluded to. Describing his analysis, that gentleman says:—

"61.07 grms. of albumen were mixed as above with 0.603 grm. of dissolved arsenious acid. I washed the mixture, after evaporation to dryness, with distilled water, until not a trace of arsenious acid dissolved out. The filtrate was intro-

duced into a bottle provided with a glass stopper, some hydrochloric acid added, and a stream of sulphide of hydrogen passed through the menstruum. The flask was then closed, and allowed to rest for some hours; after this, pure carbonic acid was transmitted through its contents, with the view of expelling all the free sulphide of hydrogen; the sulphide of arsenic was then collected on a tared filter, dried at 100° C., and weighed. Weight of tersulphide of arsenic, 0.270; equal to, of arsenious acid, 0.217.

"The above results, therefore, prove incontestably that the albumen had combined with 0.386 grm. of arsenious acid."

Now, supposing the glairy albumen of eggs to contain 12.93 per cent. of pure albumen (see Dr. Muspratt's own analysis), 61.07 grms.—the quantity employed in the above analysis—must have contained 7.896 grms. of albumen. Hence, according to the original experiments made by Dr. Muspratt, 7.896 parts of dry albumen combine with 0.386 parts of arsenious acid, or 100 with 4.88; that is to say, in the proportion of at *least* two atoms of arsenious acid to one atom of albumen. But in that gentleman's last communication, the compound is referred to as a sexalbuminate of arsenic, or as consisting of one equivalent of arsenious acid and six equivalents of albumen; though I may observe, *en passant*, that I cannot conceive from what analytical data, or, I ought rather to say, by what mode of calculation, this singular result has been arrived at.

The slight loss that was sustained by me in Experiment VII. of my former paper, and which my opponent has so ingeniously endeavoured to turn to his own advantage, will be readily accounted for by every chemist who does not wilfully close his eyes to the truth. No experimentalist, though possessed of the highest practical skill, can possibly arrive at *mathematically* accurate results;—he must always sustain a small loss in his analyses, however carefully he may conduct his experiments, particularly in such cases as the one referred to, where, in consequence of the number of manipulations that were required, the chances of error were greatly increased.

I will not now allude to Dr. Muspratt's tergiversation with respect to the purity of the white of egg; his objections to the method employed by me for the estimation of the arsenic, though be it remembered, similar in character *to that which he himself adopted;* his feeble attempt to explain the death of the cat poisoned by the so-called innocuous arsenite of albumen, on the supposition that it was caused by the presence of faint traces (*i. e.* an *inappreciable* quantity) of alkaline arsenite in the coagulate; his unwarrantable assertion that albumen is a chemical antidote to arsenious acid; the inaccuracy displayed by him in his analysis of the white of egg, where he states that the amount of solid matters left on evaporation was 14.42 per cent., and directly afterwards proves that it was 19.13 per cent;—in all of which points he has laid himself open to the severest strictures. I will content myself by simply asking him to explain the extraordinary discrepancies in the above results, and in particular, how it was that he could detect arsenic in the filtrate from the coagulate, in his recent experiments, whereas he failed to detect the slightest trace of that substance in his former analysis, when a *smaller* relative proportion of albumen was employed. One of these results, it is evident, *must be erroneous;* by no sophistry can it be proved that they are both correct. In conclusion, therefore, I will take the liberty to add the following extract from one of my opponent's former papers on this question:—"He who cannot himself firmly and fully rely on the accuracy of his operations and labours—he who cannot *swear* to the correctness of his results, may indeed occupy himself with analysis for his own private amusement and practice, but he ought never to *publish* as correct and *positive* the results of his operations and researches, as they would be greatly detrimental to the interests of science, and might be eminently injurious to others."

I remain, Gentlemen,

Yours respectfully,

THORNTON J. HERAPATH.

Bristol, *July 13th*, 1852.

P.S.—The simplest mode of proving that arsenious acid and albumen do not combine at ordinary temperatures is as follows:—Take the white of an egg, some serum of blood, or pure albumen; mix it with water by trituration in a mortar, and strain the liquid through a piece of fine muslin. Transfer the clear albuminous solution so prepared to a phial, suspend in it a piece of vitreous arsenious acid, and

immerse the bottle in a water-bath heated to 98° Fahr. Now, were Liebig's theory correct, the lump of arsenious acid ought in time to become covered with, or surrounded by, a coagulum of arsenite of albumen. No such phenomenon, however, is produced, even after the lapse of several days; neither is any precipitate or coagulum formed when a solution of pure albumen is mixed with dissolved arsenious acid; and it is worthy of remark that, in the latter case, *the acid reaction of the arsenious acid does not disappear*, whereas it ought to do so did combination take place between the two substances. A few words, also, on another experiment, which I have recently made, and which is, if possible, even more conclusive than those I have already brought before your notice. A quantity of pure albumen was dissolved in water, and the slightly opalescent solution so formed was afterwards mixed with acetic acid in such proportion that coagulation no longer ensued on the application of heat. This acetic solution of albumen was then tested as to its behaviour with the various mineral acids: with sulphuric and hydrochloric acids it immediately yielded dense coagula of sulphate and hydrochlorate of albumen (?), but with arsenious acid *no precipitate* was formed, even when a large excess of the acid was employed in solution, in water, or biborate of soda, and the mixture was heated to the boiling point by immersion in a saline bath.

T. J. H.

A BILL FOR REGULATING THE QUALIFICATIONS OF PHARMACEUTICAL CHEMISTS.

"WHEREAS it is expedient for the safety of the public that persons exercising the business or calling of pharmaceutical chemists in Great Britain should possess a competent practical knowledge of pharmaceutical and general chemistry and other branches of useful knowledge: And whereas certain persons desirous of advancing chemistry and pharmacy, and of promoting an uniform system of educating those who should practise the same, formed themselves into a society, called 'The Pharmaceutical Society of Great Britain,' which said Society was on the eighteenth day of February one thousand eight hundred and forty-three incorporated by royal charter, whereby it was provided that the said Society should consist of members who should be chemists and druggists who were or had been established on their own account at the date of the said charter, or who should have been examined in such manner as the council of the said Society should deem proper, or who should have been certified to be duly qualified for admission, or who should be persons elected as superintendents by the council of the said Society: And whereas it is expedient to prevent ignorant and incompetent persons from assuming the title of or pretending to be pharmaceutical chemists or pharmaceutists in Great Britain, or members of the said Pharmaceutical Society, and to that end it is desirable that all persons before assuming such title should be duly examined as to their skill and knowledge by competent persons, and that a register should be kept by some legally authorized officer of all such persons: And whereas for the purposes aforesaid, and for extending the benefits which have already resulted from the said charter of incorporation, it is desirable that additional powers should be granted for regulating the qualifications of persons who may carry on the business of pharmaceutical chemists: Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present parliament assembled, and by the authority of the same:

"I. That the said charter of incorporation granted to the said Society on the eighteenth day of February one thousand eight hundred and forty-three, save and except such part or parts thereof as are hereby altered, varied, or repealed, shall be and the same is hereby confirmed and declared to be in full force and virtue, and shall be as good and effectual to all intents and purposes as if this Act had not been passed.

"II. The council of the said Pharmaceutical Society shall be and the same are hereby authorized and empowered to alter and amend the bye-laws of the said Society made and established under or in pursuance of the said charter of incorporation, and to make and establish such new or additional bye-laws as they shall deem proper and necessary for the purposes contemplated by the said charter or by

this Act: Provided always, that all such original bye-laws, and all altered, amended, or additional bye-laws, shall be confirmed and approved by a special general meeting of the members of the said Pharmaceutical Society, and by one of her Majesty's principal secretaries of state: Provided also, that the existing bye-laws of the said Society shall continue in force until the next annual meeting of the said Society, to be held in the month of May one thousand eight hundred and fifty-three.

" III. At all meetings of the said Society at which votes shall be given for the election of officers, all members entitled to vote may give their votes either personally, or, in cases of residence exceeding five miles from the General Post Office, Saint Martin's-le-Grand, London, by voting papers authorized by writing, in a form to be defined in the bye-laws of the said Society, or in a form to the like effect, such voting papers being transmitted under cover to the Secretary not less than five clear days prior to the day on which the election is to take place.

" IV. The council of the said Pharmaceutical Society shall, within three calendar months after the passing of this Act, appoint a fit and proper person as a registrar under this Act, and the council of the said Society shall have the power to remove the said registrar, or any future registrar to be appointed under this Act, from the said office, and from time to time to appoint a new registrar in the room of any registrar who may die, or retire, or be removed from office as aforesaid, and also to appoint and remove from time to time a deputy registrar, and such clerks and other subordinate officers as may be requisite for carrying out the purposes of this Act, and also to pay suitable salaries to the said registrar, deputy registrar, clerks, and officers.

" V. The registrar to be appointed under or by virtue of this Act shall from time to time make out and maintain a complete register of all persons being members of the said Society, and also of all persons being associates and apprentices or students respectively, according to the terms of the charter of incorporation, and shall keep a proper index of the register, and all such other registers and books as may be required by the council of the said Society, and may be necessary for giving effect to the bye-laws of the said society and to the provisions of this Act.

" VI. All such persons as shall at the time of the passing of this Act be members, associates, apprentices, or students of the said Pharmaceutical Society of Great Britain, according to the terms of the said charter of incorporation, shall be registered as pharmaceutical chemists, assistants, and apprentices or students respectively.

" VII. The registrar to be appointed under or by virtue of this Act shall be bound, on the application of any person paying one shilling, to certify under his hand whether or no any person whose name and address shall be furnished to him appears in the said register or is a member of the Pharmaceutical Society of Great Britain or not; and the certificate of such registrar, signed by the said registrar, and countersigned by the president or two members of the council of the said Society, shall, in the absence of evidence to the contrary, be sufficient evidence of the facts therein stated up to the date of the said certificate.

" VIII. All such persons as shall from time to time be appointed under or in pursuance of the said charter of incorporation or the bye-laws thereof, or under this Act, shall be and the same are hereby declared to be fit and proper persons to conduct all such examinations as are provided for or contemplated by this Act, and shall respectively have full power and authority and are hereby authorized and empowered to examine all persons who shall present themselves for examination under the provisions of this Act in their knowledge of the Latin language, in botany, in materia medica, and in pharmaceutical and general chemistry, and such other subjects as may from time to time be determined by any bye-law: Provided always, that such examination shall not include the theory and practice of medicine, surgery, or midwifery; and the said examiners are hereby empowered to grant or refuse to such persons, as in their discretion may seem fit, certificates of competent skill and knowledge and qualification to exercise the business or calling of pharmaceutical chemists, or, as the case may require, to be engaged or employed as students, apprentices, or assistants respectively.

" IX. And to enable the said Society to provide for the examination in Scotland of such students, apprentices, or assistants in Scotland as may desire to be examined there, it shall be lawful for the council of the Society, and they are hereby required to appoint such fit and proper persons in Scotland, to meet in Edinburgh

or Glasgow, or such other place or places as the council may think desirable, and to conduct there all such examinations as are provided for and contemplated by this Act, with such and the like powers and authorities in respect thereof as are herein conferred, and to grant to the persons to be so examined such and the like certificates as are hereinbefore specified and referred to, or to refuse the same; and all the provisions of this Act shall be equally applicable to the examiners, examinations, and parties examined in Scotland, as to the examiners, examinations, and parties examined in England.

" X. Every such person who shall have been examined by the persons appointed as aforesaid, and shall have obtained a certificate of qualification from them, shall be entitled to be registered by the registrar according to the provisions of this Act, upon payment of such fee or fees as shall be fixed by the bye-laws; and every such person duly registered as a pharmaceutical chemist shall be eligible to be elected as a member of the said Society; and every such person duly registered as an assistant shall be eligible for admission as an associate of the said Society; and every such person duly registered as a student or apprentice to a pharmaceutical chemist shall be eligible for admission into the said Society, according to the bye-laws thereof.

" XI. That no person who is a member of the medical profession, or who is practising under right of a degree of any university, or under a diploma or licence of a medical or surgical corporate body, shall be entitled to be registered under this Act; and if any registered pharmaceutical chemist shall obtain such diploma or licence, his name shall not be retained on the said register during the time that he is engaged in practice as aforesaid.

" XII. From and after the passing of this Act, it shall not be lawful for any person, not being duly registered as a pharmaceutical chemist according to the provisions of this Act, to assume or use the title of pharmaceutical chemist or pharmaceutist in any part of Great Britain, or to assume, use, or exhibit any name, title, or sign implying that he is registered under this Act, or that he is a member of the said Society; and if any person, not being duly registered under this Act, shall assume or use the title of pharmaceutical chemist or pharmaceutist, or shall use, assume, or exhibit any name, title, or sign implying that he is a person registered under this Act, or that he is a member of the said Society, every such person shall be liable to a penalty of five pounds; and such penalty may be recovered by the registrar to be appointed under this Act, in the name and by the authority of the council of the said Society, in manner following; (that is to say,)

" In England or Wales, by plaint under the provisions of any Act in force for the more easy recovery of small debts and demands:

" In Scotland, by action before the Court of Session in ordinary form, or by summary action before the sheriff of the county, or in the royal burghs before the magistrates of the burghs where the offence may be committed or the offender resides, who, upon proof of the offence or offences either by confession of the party offending or by the oath or affirmation of one or more credible witnesses, shall convict the offender, and find him liable in the penalty or penalties aforesaid, as also in expenses; and it shall be lawful for the sheriff or magistrate, in pronouncing such judgment for the penalty or penalties and costs, to insert in such judgment a warrant, in the event of such penalty or penalties and costs not being paid, to levy and recover the amount of the same by poinding:

" Provided always, that it shall be lawful to the sheriff or magistrate, in the event of his dismissing the action and assoilzieing the defender, to find the complainer liable in expenses; and any judgment so to be pronounced by the sheriff or magistrate in such summary application shall be final and conclusive, and not subject to review, by advocation, suspension, reduction, or otherwise.

" XIII. Provided always, that no action or other proceeding for any offence under this Act shall be brought after the expiration of six months from the commission of such offence; and in every such action or proceeding the party who shall prevail shall recover his full costs of suit or of such other proceedings.

" XIV. All and every sums and sum of money which shall arise from any conviction and recovery of penalties for offences incurred under this Act shall be paid as the Commissioners of Her Majesty's Treasury shall direct.

" XV. If any registrar under this Act shall wilfully make or cause to be made

any falsification in any matters relating to any register or certificate aforesaid, every such offender shall be deemed guilty of a misdemeanor.

" XVI. If any person shall wilfully procure by any false or fraudulent means a certificate purporting to be a certificate of registration under this Act, or shall fraudulently exhibit a certificate purporting to be a certificate of membership of the Pharmaceutical Society, every such person so offending shall be adjudged guilty of a misdemeanor."

TO CORRESPONDENTS.

M. P. S., Brighton.—It is perfectly true that, by a clause in the Pharmacy Bill, the present members, associates, &c., are exonerated from the payment of any more subscriptions, and that they will remain Pharmaceutical Chemists or Pharmaceutists for life, without the Council being able to enforce any such payments by bye-laws, which can never contravene the provisions of an Act of Parliament, however anxious the Council may be to get over the financial difficulty in which they are placed by the statesman who concocted this Bill. This oversight, however unintentional, is the best thing that could have happened to the Society. The members ought not, in justice, to be called upon for further subscriptions, as the revenue ought to be raised in future by examination fees, as is the case in the Colleges of Physicians and Surgeons, London University, Apothecaries' Hall, and all similar institutions. In fact, the Society does not require subscriptions from present members for any legitimate purposes.

George Murrell, Stafford.—The Pharmaceutical Society will never regain its former position, whilst the private interests of a few individuals are consulted before the general good of the members.

James Adams, Heighton, near Spilsby.—The powder possesses no marked properties by which its source may be indicated.

J. B. N.—(1.) Our correspondent is mistaken in supposing that soda water generally contains sulphuric acid. (2.) The best method to detect the carbonate of soda is to evaporate the water to dryness and examine the residuum with the usual reagents. (3.) The other questions contained in *J. B. N.'s* letter are more suitable for a medical journal than ours.

G. B.—1. The equivalent of gum is determined by its combination with oxide of lead, which consists of one equivalent of oxide of lead, or 112 parts, and 186 parts, or one equivalent of gum. 2. The number of equivalents of carbon, hydrogen, and oxygen, in 186 parts or one equivalent of gum, is ascertained by a simple rule of three sum. Thus, if 100 parts of gum contain 41.94 parts of carbon, 186 parts of gum must contain 78 parts of carbon, which are equal to 13 equivalents of carbon, or 13 times 6, the equivalent number of carbon.

Pharmaceutist.—No doubt the ex-M.P. was very hungry; but the Council not voting him the plate, he has been obliged to go without his dinner. However, there has been a special general meeting of the members forthwith summoned, on another pretext, to reverse this decision of the Council. He must get somebody to whitewash his reputation. Why don't his friends send him to a convent for a few months, out of the reach of the vanities of this wicked world?

W. D. T.—1. Oxide of copper is prepared by exposing nitrate of copper to a red heat. 2. Narcotine is soluble in alcohol, and insoluble in water; consequently, proof spirit is not its best solvent.

S. D., Cheltenham.—Bronze is made by heating gently in a retort, for some hours, a mixture of five parts of protosulphuret of tin and eight parts of bichloride of mercury, and afterwards raising the heat almost to redness.

Verus, Liverpool.—No doubt, as a general rule, the ammonia test is to be relied on. But it has been found that some genuine specimens of balsam of copaiba have given the reactions of fixed oils. It is safe to pronounce a specimen pure which answers to this test, but not equally safe to pronounce one adulterated which does not answer to it.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

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No. VIII.

Operations which involve Mixing and Separation of the first degree.

When, by volatilization, the volatile parts are collected in a proper apparatus, and are fluid at ordinary temperatures, this operation is called distillation. When the volatile parts are solid at such temperatures, it is called sublimation. The objects of this process are manifold. Sometimes it is employed to separate volatile bodies from non-volatile ones, or more volatile substances from less volatile ones, or to combine several volatile bodies together. These processes are used for mixing or separating in the first or second degree. The character of the apparatus required, as well as the temperature, depends upon the nature and quality of the material which is to be operated upon. Fluids are generally distilled in retorts or metallic vessels called stills, and solid bodies are volatilized in subliming apparatus of various forms and materials.

The preparation of distilled water is a separation of pure water from its saline contents by distillation. The water of springs and rivers always contains more or less saline and other substances dissolved in it, from which it must be purified before it can be applied to pharmaceutical purposes. This operation is generally performed in a still, and seldom in a retort. The water passes by heat into steam, which is again condensed in the cooling apparatus, whilst the saline contents remain in the still, being non-volatile. Three parts of the water are usually collected.

The separation of alcohol from the water with which it is usually mixed is also performed by distillation. Alcohol distils at a lower temperature than water, by which means it can be, for the most part, separated from it. The separation of alcohol from fluids which have undergone various fermentations, is conducted on the large scale in distilleries, by means of large stills. To obtain the spirit sufficiently

strong, it is customary to re-distil the fluid which results from the first operation. It is also further rectified by a third distillation, slowly performed, either with or without the addition to the contents of the retort of saline substances, such as chloride of calcium, which has a great affinity for water.

The natural ethereal oils are volatile aromatic fluids, to the presence of which plants are indebted for their peculiar odour. They are nearly all obtained by distillation, except a few, as oils of lemon and bergamot, which are prepared by expression. The substances from which the oils are to be obtained are either heated with water in a still, or a stream of hot steam is passed through them to separate their volatile oils. They are generally treated with eight or ten times their weight of water, and reduced into small fragments when necessary. The still should not be full by about one sixth of its capacity, or the contents would jump over by ebullition. Distillation should be proceeded with as long as the water comes over laden with oily particles. However, care should be taken that it is not continued until the water in the still becomes so low that the vegetable substances are in danger of being burnt. The cooler the condensing apparatus is kept, the greater will be the product.

Heavy volatile oils, which sink in water, should be distilled more rapidly than those which are lighter, because they are less volatile, and not so readily separated from the substance which contains them. It is oftentimes necessary, in these cases, to repeat the distillation with a part of the water which has previously passed over, to separate all the oil, and even to repeat this operation as long as the water comes over surcharged with oil.

The oil is separated from the water by means of a separatory funnel. The addition of common salt to the water facilitates this result. Ethereal oils should be preserved in a dark, cool place, in vessels well closed and quite full.

Distilled waters are solutions of ethereal oils in water, with or without a small portion of alcohol. They are prepared in the same manner as ethereal oils, and often prepared simultaneously with them, that is to say,—the water, from which the chief part of the essential has been separated, still contains the ethereal oil in a state of saturation and is, therefore, an aromatic distilled water. When the distilled water is re-distilled from a substance to impregnate it with more oil, the operation is called cohobition, and the product cohobited water.

The quality of distilled waters depends upon their being colourless, bright, and very fluid. They should possess in the highest degree the odours and tastes of the aromatic substances from which they were prepared, and not be empyreumatic. In the first instance, when prepared in the ordinary way, they have a disagreeable odour, which they lose when placed in a dark, cool place, and are only slightly covered. Those which are prepared by steam or in a water-bath, as a rule, acquire the best odour. Many waters, when kept some time, spoil and become slimy, particularly under the influence of light, heat, and air. Waters often remain longer unimpaired when they are re-distilled.

Aromatic waters can also be prepared by simply mixing ethereal oils

with distilled water, and possess, when thus prepared, the advantage of being more uniform in their characters. They can further be prepared by distilling water, with a slight admixture of alcohol, from aromatic plants, as long as the fluid comes over free from turbidity. These alcoholic solutions are to be mixed with the necessary quantity of simple distilled water, before being employed for medical purposes, and constitute what are termed concentrated waters. With some substances, whose volatile oils distil only at high temperatures, it is necessary to increase the boiling point of the water in the still by the addition of some saline body, as a common salt, so that the water may acquire the temperature at which those oils become readily volatilized with the aqueous vapour.

When aromatic substances are distilled with spirit, or a mixture of spirit and water, in which the former predominates, the products are called aromatic spirits. The method of their preparation is the same as with distilled waters, with the difference only, that less heat is required. When, from the large quantity of solid substances in the still, there is danger of these being burnt, it is advisable to add some water to the contents of the still, which may be left behind, as the spirit passes over first. These aromatic spirits can be readily made by mixing alcohol with the volatile oils. Aromatic spirits should be clear, and have the odour and taste of the substances from which they were prepared, and also possess a proper specific gravity which should be ascertained by the hydrometer. They will retain their virtues a long time in well stoppered bottles.

Operations which have for their objects Mixture and Separation of the second degree.

The processes whereby mixture and separation of the second degree (chemical mixture and decomposition), are accomplished, presuppose in particular, a special knowledge of chemistry. Many of these processes we have already partially treated upon, as well as the implements required for them. It only remains to discuss their general characters. Solution in the wet way takes place frequently in the formation of salts, when two or more bodies with opposite properties (as acids and bases) combine, whereby their opposite properties become neutralized; this operation is simple as ordinary solution. The bodies penetrate one another by contact, either at ordinary temperatures, as by alkalies and acids; or they require heat for their solution, as by difficultly soluble earths; decomposition mostly ensues by solution. Either the dissolved body must take up a constituent of the compound menstruum, to be able to enter into combination with it, or the menstruum separates a constituent of the dissolved body. When the separated body is gaseous it is evolved in bubbles, and escapes from the fluid, which is said to effervesce. It should be remarked that the menstruum should be sufficiently dilute, and the solid body added to it in a comminuted state, and in small quantities at a time, to prevent the fluid by effervescing rising over the sides of the vessel in which the mixture takes place.

Sublimation is most applied in pharmacy for the purpose of

obtaining mixture and separation of the second degree. It is employed either for the separation of volatile from non-volatile substances, or for the combination of several volatile bodies by heat, and sometimes for both purposes. The volatile solid products or educts are termed sublimates. Those which are of a flocculent nature were formerly called flowers, as, for example, flowers of sulphur.

The sublimation of very volatile substances, or of such as pass over with fluid bodies, should be conducted in a retort with a receiver, as in the case of distillation. The retort should be placed deep in a sand-bath and be bound air-tight to the receiver, which should be large, as well as the neck of the retort. To remove partly the atmosphere in the retort, a small tube can be introduced at the joint, through which the air will pass when heat is applied to the retort. The receiver, when the substance is very volatile, must be surrounded by cold water or ice, to keep it as cool as possible. When it is necessary to allow moisture to escape, and the body to be sublimed is not very volatile, the receiver need not be luted to the retort.

A few volatile substances which evolve no moisture may be sublimed in an alembic or any similar vessel. The heat should be applied gently at first, and gradually increased until sublimation is effected. The alembic should be placed in sand up to its mouth, and the sand partially removed when sublimation commences, so that the sublimate may attach itself to the upper part of the vessel. Vessels with narrow openings must be watched from time to time, to see that the openings are not stopped up with the sublimate, which should be carefully removed when such is the case, The sand-bath may be raised at last to a red heat, if anything remains to be sublimed. To separate the sublimate from the glass vessel, the latter, whilst hot, should be struck with a wet cloth in that part where the sublimate is, which causes the glass to break into pieces, and to be easily separated from the sublimate.

THE FORMATION OF ORGANIC COMPOUNDS.

No. III.

BY DR. CHARLES LÖWIG.

As heat calls forth the original affinities of the elements of organic compounds, and thereby causes the decomposition of these compounds, with the separation of inorganic and the formation of organic bodies, so are the like results produced by other influences, yet partly unknown. When this decomposition takes place by ordinary temperatures, it is called fermentation or putrefaction. However, by putrefaction is understood particularly the decomposition of bodies containing nitrogen; and by fermentation, the decomposition of bodies free from nitrogen. These changes are also named spontaneous decomposition, or self-separation.

All compounds which consist entirely of carbon and hydrogen are not subject to spontaneous decomposition. The degree of capacity for decomposition in organic oxides is often dependent on their solubility in water; without doubt because its constituents frequently take part in the formation of new compounds. Thus the compounds which are

insoluble in water (as the volatile oils, the resins, the fatty acids), with those which are difficultly soluble (as benzoic, cuminic, and camphoric acids), and generally the compounds which are poor in oxygen, show a great resistance to change; whilst the acids which are rich in oxygen and easily soluble in water (as tartaric, malic, and citric acids), have a strong disposition to self-separation. Those, however, which particularly deserve to be named are compounds of a higher order—the compounds in general of the vegetable kingdom (as starch, gum, sugar), and those of the animal organismus (as albumen, fibrin, casein), in their fresh condition, or the so-called protein compounds; further, the gelatine and chondrine yielding tissues, whose principal constituents are only bound together by a slight affinity for one another. The disposition and capacity for decomposition increase with the number of elements and of individual atoms which constitute the compound. This disposition, therefore, appears particularly strong in the above-named compounds of animal origin, and in the bodies related to them, of the vegetable kingdom.

Very durable compounds containing nitrogen, and even very coherent protein substances, as hair, are not subject to putrefaction. Decomposition generally begins when bodies are dissolved in water, or are completely saturated with it, and exposed to a temperature of 50° to 86° Fahr. For the introduction of putrefaction the atmosphere is necessary; but when it has once begun, the decomposition proceeds rapidly, even if the atmosphere be completely excluded. The compounds which readily undergo putrefaction mostly contain small quantities of sulphur and phosphorus. The cause of putrefaction in these cases consists in the nitrogen, the sulphur, and the phosphorus separating in combination with the hydrogen of the organic substance, whilst the oxygen combines with a portion of the carbon. Putrefaction, therefore, gives a disagreeable odour, by which it can be immediately distinguished, and which proceeds particularly from the evaporation of the above-named hydrogen combinations; and in proportion as these are emitted the odour becomes unbearable. In consequence of the oxygen not being sufficient for the complete oxidation of the carbon, and the hydrogen not being used entirely for the above-mentioned hydrogen combinations, an evolution of carburet of hydrogen and pure hydrogen gas takes place, whilst the carbonic acid is almost entirely taken up by the ammonia which is formed.

In its different stages, putrefaction produces without doubt, as by dry distillation, a great number of new organic compounds, whose properties and composition are yet entirely unknown. In some instances the products of decomposition have poisonous properties, as, for example, the poison of sausages. Putrefaction is, as a rule, accompanied with the formation of infusoria; indeed, it is not improbable that these infusoria are the medium of the entire decomposition.

The general non-nitrogenous compounds of the vegetable kingdom in their pure state have very little disposition to spontaneous decomposition. A solution of pure sugar undergoes no change after a long time; indeed, even nitrogenous bodies, as urea, behave in a similar way. But when their aqueous solutions are brought in contact with

the above-named easily decomposible nitrogenous compounds, particularly when these are already in a state of putrefaction, then fermentation proceeds, under otherwise favourable conditions, very rapidly. One and the same nitrogenous substance can, according to the conditions and degree of change in which it finds itself, break up one and the same non-nitrogenous body into different products. Fresh animal membranes carefully purified exhibit no effect on starch, sugar, or gum, as long as they suffer no decomposition themselves. But when these are in a state of change, and are brought in contact with a solution of sugar at different periods of their decomposition, the sugar is sometimes decomposed into lactic acid and water; sometimes into mannite and mucus; sometimes into butyric acid, with the evolution of hydrogen; and sometimes into alcohol and carbonic acid.

The substances in a state of decomposition, which induce fermentation in others, are called ferments. Every substance is capable of fermention which can be decomposed by the influence of a ferment. A ferment has lost its power of exciting fermentation from the moment when its own decomposition has terminated; it operates thus only so long as it is itself in a state of putrefaction. According to the chief products which are formed, the various fermentations are distinguished, as, vinous fermentation, lactic acid fermentation, butyric acid fermentation, &c.

The phenomena which appear in vinous fermentation are in their course most accurately known. These consist in the breaking up of grape or fruit sugar into carbonic acid and alcohol. One atom of sugar, $C_{12} H_{12} H_{12}$, decomposes into two atoms of alcohol, $C_8 H_{12} O_4$, and four atoms of carbonic acid, $C_4 O_8$. As however, starch, cane sugar, and milk sugar easily pass into grape sugar, they can likewise be employed for the manufacture of alcohol. In the natural sugar juices, as in the ripe juice of grapes, the principal constituents are, fruit and grape sugars on the one side, and a nitrogenous so-called protein compound on the other. So long as the juice is enclosed in the cells of the fruit, it undergoes no change, nor does this change happen when the juice is expressed in an atmosphere free from oxygen. But when the clear juice comes in contact with a small bubble of air or oxygen, it is rendered turbid in a very short time at a temperature from 50° to 59° Fahr., and at the same time the evolution of carbonic acid and the formation of alcohol begin. This decomposition, however, will not take place when the air is conducted previously through a hot tube. The fluid remains in continual motion as long as any sugar is present, and becomes thick in proportion as the fermentation proceeds. When this process is finished, that is, when the sugar is entirely decomposed into carbonic acid and alcohol, the fermented fluid becomes clear by the subsidence of a greyish-white mass, which possesses in a remarkable degree the capacity to decompose a fresh quantity of sugar, without the admission of air, when the sugar is dissolved in six, twelve, or more parts of water, and exposed to a temperature between 50° and 59° Fahr.

Two or three parts of this substance, which is called yeast, possess the power to decompose 100 parts of sugar. However, a certain quantity of yeast can induce fermentation only in a certain quantity of

sugar; therefore, when an excess of the latter is present, the excess will be found unchanged when fermentation has ceased in the liquid. The sediment which is formed in this case has no longer the property of inducing fermentation in a saccharine solution, and is therefore called decomposed yeast. No yeast exists in a solution of pure sugar; the material from which it is formed is a nitrogenous substance, for when white of egg or an analogous protein compound is added to a fluid in a state of fermentation, the quantity of yeast is very considerably increased. Accordant microscopic observations have proved that the undecomposed yeast is a plant (yeast fungus) which consists of simple cells not greater than $\frac{1}{100}$ of a millimetre, and which cells are independently nourished and increased, and are composed of non-nitrogenous coverings and nitrogenous contents.

In the decomposed yeast, the cells are burst open over one another and their contents discharged, while only their insoluble covering remains behind. The fermentation of the sugar only takes place as long as these contents are in a state of putrefaction; and this fermentation only proceeds when the yeast cells are in direct contact with the saccharine solution. When the cells are destroyed by trituration, fermentation cannot take place, and only appears when new cells have been formed.

Putrefaction as well as fermentation can, by various influences, be prevented; or, when they have already commenced, be interrupted in their course. The power of producing fermentation in yeast, and the putrefaction of nitrogenous bodies, can be partly destroyed and partly prevented:—1. By thoroughly drying these substances at 212° Fahr., and by long boiling them with water, by which means the protein constituents are converted into an insoluble, so-called coagulated condition. 2. By completely preventing the access of the atmosphere to them; because, as already remarked, the presence of air, or oxygen, is always necessary for the introduction of putrefaction, as well as for the formation of yeast. The exclusion of the air is an excellent means, therefore, to prevent putrefaction, as is shown by Appert's method of preserving fruits, meats, and other articles of diet. The same object is accomplished when the substance is slowly heated to 212° Fahr. in a hermetically closed vessel. Meat, when placed in water which has been sufficiently boiled, and which is covered with a layer of oil, keeps many weeks. 3. Putrefaction and fermentation can be prevented or destroyed by a low temperature. Neither can take place at a temperature of 32° Fahr., or under. 4. By the so-called antiseptics, and by most chemically acting materials, because they either abstract from the body the water which is necessary to putrefaction, or form a chemical combination with it, in which the disposition to putrefaction is removed. Spirits of wine, containing from 70 to 80 per cent. of alcohol (used for the preservation of anatomical specimens), saltpetre, and common salt, act, doubtless, by extracting water. As chemically operating bodies, which act in a similar way, may be reckoned strong mineral acids, corrosive of sublimate, salts of copper, as blue vitriol; many organic compounds, as creosote, and analogous ones formed by dry distillation, as wood vinegar; particularly tannin, which combines with gelatinous tissue to form leather,

and which forms, with nitrogenous bodies, insoluble compounds; also, sulphur, sulphurous acid, and its salts; volatile oils containing sulphur, as oil of mustard, chlorinated lime, &c., which act in a similar way. Non-nitrogenous compounds, when they occur mixed with nitrogenous ones, can be preserved without decomposition when the latter are as speedily as possible removed; as, for example, in the preparation of sugar from cane-juice, and the steeping of wood in solutions of bichloride of mercury and chloride of zinc.

As sugar is decomposed by vinous fermentation into carbonic acid and alcohol, so are the non-nitrogenous compounds broken up, as starch, sugar, and gum, when they are brought in contact with different ferments, according to the temperature, either into lactic acid or butyric acid; in the latter case, hydrogen is always evolved. Cheese which is already in a state of putrefaction serves as a ferment in these instances. These decompositions appear to proceed only from the existence of certain fungi.

Pure urea behaves in its watery solutions as pure sugar; it undergoes no change. Fresh urine, in which, besides urea, animal mucus is present, putrefies very slowly in thoroughly clean vessels; but when a little yeast is added to it, putrefaction takes place after a few days. When urine is allowed to putrefy without the addition of yeast, a ferment is formed during putrefaction which precipitates as a white powder, and possesses the property of completely decomposing a large quantity of fresh urine within twenty-four hours, by a temperature between 53° and 60° Fahr. By the putrefaction, the urea is broken up with the contemporaneous decomposition of water into carbonate of ammonia.

In the vinous fermentation, the ferment acts only as long as it is itself in a state of decomposition. It therefore produces decomposition at the same time in both nitrogenous and non-nitrogenous substances. However, in many cases the nitrogenous body operates as a ferment, without having previously suffered decomposition. When a freshly prepared solution of emulsine, or an emulsion of sweet almonds, is added to a solution of amygdaline, it is decomposed immediately into oil of bitter almonds, prussic acid, and sugar. In the same manner salicine is broken up into saligenine and sugar. Myronic acid, (?) which exists in black mustard, is decomposed through the agency of an emulsine-like body, which is present in mustard, into an ethereal oil. Indeed, through contact with paper, straw, or charcoal powder, a solution of sugar will undergo the butyric acid fermentation.

While most compound bodies of a high order are decomposed by the processes of fermentation and putrefaction into less complex substances, certain organic bodies have the property to change organic compounds into others which possess either similar or even more complex constitutions. Thus in malt is found a body called diastase, which, in small quantities, possesses the property of converting, by the presence of water and by a temperature from 104° to 122° Fahr., starch first into dextrine, which is isomeric with starch, and which is then changed into sugar by the assimilation of the elements of two atoms of water. But when a solution of diastase is heated to the boiling point, it loses this property. Diluted acids operate exactly like diastase. One part

of sulphuric acid diluted with 400 parts of water, changes, with the assistance of heat in a few hours, 30 to 40 parts of starch into sugar, without the acid combining with these substances or being decomposed. A small quantity coagulates a large quantity of casein. Under the above category may be ascribed the action of the questionable pepsin by digestion.

THE CHEMISTRY OF THE NATURAL ORDER RUBIACEÆ.

BY PROFESSOR ROCHLEDER.

In undertaking this investigation, which I commenced some time since, I proposed to myself the following question:—"In what relation stand plants to one another which belong to a natural order with reference to their composition?" Or, what is the same,—"Does the resemblance in form of plants of a natural order depend upon a resemblance in their constitution?" Berzelius has expressed the opinion, that such is most likely the case; and Liebig has arranged the organic bases, in his work on organic chemistry, according to the natural orders of the plants from which they are derived.

The analogy in the composition of meconic and cheledonic acids, the presence of valerianic acid in *Sambucus nigra* and *Viburnum opulus*, and other facts of a like kind, are available as an argument for the correctness of this view. It was desirable for this investigation, to examine the same parts of each plant, and, where possible, all parts. In some cases it was impossible to obtain the materials. Therefore the roots of *Cephaëlis ipecacuanha*, and *Chiococca racemosa*, the seeds of *Coffea arabica*, the bark of other plants, and the herbaceous parts of some were alone examined.

In all these plants tannic acids were present, bodies which, although volatile by certain temperatures without decomposition, are yet crystallizable, and which, in contact with bases, either reduce them or are oxidized with extraordinary rapidity at the cost of the oxygen of the air. It was not possible to prepare with these acids baryta or silver salts, from which the compositions of these acids might with certainty and ease be ascertained. These were found by the analyses of the free acids or their lead salts. The products of the decomposition of these bodies were in all cases examined, where it was possible to obtain a sufficient quantity in a pure state; and, to prevent error, the same substance taken from different plants, and different parts of the same plant, was submitted to a strict examination. The conclusions which I have arrived at are the result of more than a thousand elementary analyses and a nine years' labour, and therefore are not a mere phantasy.

1. In the seeds of *Coffea arabica* are contained, besides sugar, fats, and legumine, coffeo-tannic acid, viridic acid, citric acid, and caffeine.

2. In the root of *Cephaëlis ipecacuanha* were found ipecacuanhic acid, pectic acid, gum, starch, some fat, and emetine.

3. In the root of *Chiococca racemosa* exist coffeo-tannic acid, caincic acid, and emetine.

4. In the bark of *Portlandia grandiflora* are contained chinovic acid, chinova red, gum, kinic acid, and chinova-tannic acid.

5. The bark of *Chincona scrobiculata* contains kino-tannic acid, kinic red, kinic acid, chinovic acid, cinchonine, chincotine, and quinine.

6. In the herb of *Asperula odorata* are contained asper-tannic acid, rubichloric acid, citric acid, coumarine, and catechine.

7. In the herb of *Rubia tinctorium* are found rubi-tannic acid, citric acid, and rubichloric acid.

8. In the root of *Rubia tinctorium* exist rubichloric acid, citric acid, ruberythric acid, pectic acid, alizarine, pupurine, and sugar.

9. In the herb of *Galium verum* are found gali-tannic acid, rubichloric acid, and citric acid. The two latter substances are also found in *Galium aparine*, besides a small quantity of tannic acid. Pectic acid was only found in two plants, namely, in the roots of *Cephaëlis ipecacuanha* and *Rubia tinctorium*. It therefore cannot be considered as a characteristic constituent of the natural order *rubiaceæ*. The same remark holds good with reference to coumarine, found in *Asperula odorata*, and also with regard to the organic bases which were detected in four plants, *Cephaëlis ipecacuanha*, *Chiococca racemosa*, *Coffea arabica*, and *Cinchona scrobiculata*; in the remainder no organic bases could be found. All plants of the family *rubiaceæ* which have been examined, contain an acid, the watery solution of which is subject to the following changes:—1. It becomes coloured darkly green by chloride of iron. 2. It becomes brown by potash in the air, under the absorption of oxygen. 3. It contains fourteen equivalents of carbon and eight equivalents of hydrogen, and varying quantities of oxygen, rising from six to ten equivalents. 4. All these acids, so far as they have been examined in their relations, are decomposed by the action of acids, alkalies, oxygen, or heat, leaving a product which consists of twelve equivalents of carbon and six of hydrogen, with the loss of two equivalents of carbon and as many equivalents of hydrogen. In this product the oxygen amounts to five or six equivalents.

These acids form a continuous series. Some of them possessing different properties have the same constituents. I place them in the order of their oxygen contents, from the poorest to the richest in oxygen.

Ipecacuanhic acid, ...	$C_{14} H_8 O_6$
Coffeo-tannic acid, ...	$C_{14} H_8 O_7$
Chinova-tannic acid, ...	$C_{14} H_8 O_7$
Asper-tannic acid, ...	$C_{14} H_8 O_8$
Rubi-tannic acid, ...	$C_{14} H_8 O_9$
Kino-tannic acid, ...	$C_{14} H_8 O_9$
Gali-tannic acid, ...	$C_{14} H_8 O_{10}$

The coffeo-tannic acid breaks up by high temperatures into pyrocatechine, $C_{12} H_6 O_4$, charcoal, and water. By action of potash and the presence of air, a compound results consisting of $C_{12} H_6 O_5$.

The chinova-tannic acid is decomposed, by the action of acids, into sugar and chinova red, $C_{12} H_6 O_5$.

The asper-tannic acid leaves, by treatment with acids, a body of the composition, $C_{12} H_6 O_6$.

The kino-tannic acid is converted, by the action of the atmosphere, into kinic red, $C_{12} H_7 O_7 = C_{12} H_6 O_6 + H O$.

The tannic acids of *Galium verum* and *aparine*, and of the leaves of *Rubia tinctorium* exist in such small proportions in these plants, that it is impossible, even by operating on large quantities of them, to obtain sufficient of the acids to examine the products of their decomposition. The ipecacuanhic acid has, for the above reason, not been examined in this respect.

From what has been here stated, it is evident that all the examined plants of the order *rubiaceæ* contain a tannic acid of the formula, $C_{14} H_8 O_n$. This formula may be written, with reference to the decomposition of this body, thus, $C_{12} H_6$, $C_2 H_2$, O_n.

All the plants belonging to the division *stellatæ*, of the order *rubiaceæ*, contain, besides the characteristic tannic acid, in all their examined parts, rubichloric acid and citric acid. The rubichloric acid approaches directly in its composition to the tannic acids. It contains carbon and hydrogen in the same proportions, and its formula is $C_{14} H_8 O_9$. It is decomposed by the action of acids at high temperatures into formic acid and chlorubine, so that its formula can be written $C_{12} H_6$, $C_2 H_2$, O_9. By its properties it can be readily distinguished from each tannic acid, as by its not becoming coloured green with chloride of iron, &c.

The citric acid must be considered a characteristic ingredient in the *stellatæ*, on the same ground that rubichloric acid is a characteristic constituent of this group. Where the hydrate of citric acid is written $C_{12} H_6 + O_{12}$, it represents a member of the formula $C_{12} H_6$, $C_2 H_2$, O_n.

As the *stellatæ* contain, besides the characteristic tannic acid, the analogous compounds, rubichloric and citric acids, which differ in their reactions, so in the examined plants of the *cinchonaceæ*, another division of the order *rubiaceæ*, the tannic acid is accompanied with kinic and chinovic acids. The kinic acid, $C_{14} H_8 O_8$, approaches as the rubichloric acid in regard to its composition, the tannic acids of the formula $C_{14} H_8 O_n$, of all the plants of the order *rubiaceæ*, but differs in all its reactions from them. The citric acid of the *stellatæ* is in this group replaced by an acid which contains, as the citric acid, twelve equivalents of carbon, and its formula is $C_{12} H_9 O_8$.

In the true plants of the division *Coffeaceæ*, namely, *Cephaëlis ipecacuanha*, *Coffea arabica*, and *Chiococca racemosa*, are contained, besides the tannic acids, $C_{14} H_8 O_n$, no characteristic substance in common with that of the previous divisions. In the seeds of *Coffea arabica* is the citric acid of the *stellatæ*, although in unimportant quantity; in the root of the *Chiococca racemosa* is the chinovic acid of the *cinchonaceæ*, conjugated with an hydrate of carbon, contained as caincic acid; in the root *Cephaëlis ipecacuanha*, both acids are absent. The large quantity of starch and gum which this root contains probably replaces the acids, as anhydrous citric acid plus two equivalents of water $= C_{12} H_7 O_{13}$ is starch or gum $= C_{12} H_{10} O_{10}$ in which three equivalents

of hydrogen replace three equivalents of oxygen. If we place the plants of these three groups with their characteristic ingredients under one another, we get the following tabular view :—

RUBIACEÆ.

I.—*Characteristic Ingredients.*	II.—*Characteristic Ingredients.*	III.—*Characteristic Ingredients.*
	1.—Stellatæ.	
Tannic acid of the formula $C_{14} H_8 O_n$. n = 8, 9, or 10.	Rubichloric acid, $C_{14} H_8 O_9$.	Citric acid, $C_{12} H_6 O_{12}$.
	2.—Cinchonaceæ.	
Tannic acid of the formula $C_{14} H_8 O_n$. n = 7 or 9.	Kinic acid, $C_{14} H_8 O_8$.	Chinovic acid, $C_{12} H_9 O_3$.
	3.—Coffeaceæ.	
Tannic acid of the formula $C_{14} H_8 O_n$. n = 6 or 7.	[Wanting.]	Citric acid, $C_{12} H_6 O_{12}$, or Chinovic acid, $C_{12} H_9 O_3$, or gum and starch, = $C_{12} H_{10} O_{10}$.

As regards the large quantity of the characteristic tannic acids in the different groups, it may be stated that they are found in the greatest abundance in the *coffeaceæ* and *cinchonaceæ*, although the greatest part of them are changed before the plants reach us. In the *stellatæ*, the quantity is very small, particularly in the *Galium aparine*, and the leaves of the *Rubia tinctorium*.

If we consider these tannic acids in relation to their oxygen, it appears that it is found in the greatest proportion in the acids of those plants which grow in cold climates, as the *stellatæ*, or in those which are found in high regions, as the *cinchonas*, which grow from 4000 to 5000 feet above the level of the sea on the Andes. The oxygen is small in quantity in the tannic acids of plants which belong to hot climates, as *Cephaëlis ipecacuanha*, *Coffea arabica*, and *Chiococca racemosa*. In the *stellatæ* the tannic acids contain from eight to ten equivalents of oxygen, while, in the chief coffee plants, the same substances contain only six or seven equivalents. Deoxidation thus proceeds farther by high temperatures than in cold climates. When we consider those plants which, besides a tannic acid, contain an acid of the formula $C_{14} H_8 O_n$, it appears that these acids differ fully in their constitution by one equivalent of oxygen, so that by the separation of this one equivalent of oxygen, one acid can be converted into another. Their different properties and their different decompositions show sufficiently that they cannot be considered here as different oxidation products of one radical.

The tannic acid, $C_{14} H_8 O_7$, in *Portlandia grandiflora*, can, from kinic acid, $C_{14} H_8 O_8$, the kinic acid, $C_{14} H_8 O_8$ of the *Cinchona scrobiculata*, can, from kino-tannic acid, $C_{14} H_8 O_9$, the asper-tannic acid, $C_{14} H_8 O_8$ of the *Asperala odorata*, can, from rubichloric acid, $C_{14} H_8 O_9$, the rubichloric in *Galium verum*, can, from gali-tannic acid, $C_{14} H_8 O_{10}$, be formed by the separation of one equivalent of oxygen. I have here placed the acids beside one another which are contained in one and the same plant.

The rubi-tannic acid of the *Rubia tinctorium* can pass directly over

into the isomeric rubichloric acid. If the hydrate of citric acid, $C_{12}H_6O_{12}$ takes up an equivalent of formic acid and gives off oxygen, the formation of the tannic acids of the *rubiaceæ* becomes explained thereby. In the same way the chinovic acid, $C_{12}H_9O_3$, could be converted into this acid by taking up oxalic acid and oxygen, $C_{12}H_9O_3+C_2O_3=C_{14}H_9O_6$. When an equivalent of water is separated, $C_{14}H_8O_5$ results, which, combined with one equivalent of oxygen, would form ipecacuanhic acid, and with two equivalents of oxygen, coffeo-tannic acid. That chinovic acid is capable of forming combinations in itself is shown by the research on caincic acid, which is chinovic acid combined with a hydrate of carbon, which has the composition of acetic acid,

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FACTS AND DISCOVERIES IN SCIENCE.

The Pharmaceutical Application of Carbon.—It is highly probable that the property which carbon possesses, of appropriating saline matters held in solution, has not yet been sufficiently studied and made known. M. Payen, many years since, announced that its power of separating lime and some of the calcareous salts is such, that if 100 parts of distilled water, saturated with lime, be boiled with 10 parts of charcoal, the liquor when filtered will show no traces of lime. Some time after this the same observation was proved to apply, to the same extent, to the alkalies. A few years afterwards, Professor Graham investigated the action of carbon on nitrate of lead, arsenious acid, nitrate of silver, sulphate of copper, sulphate of ammoniated copper, the hydrate of lead dissolved in potass, solution of iodine, and the chlorides of soda and lime. He failed to precipitate the arsenious acid or sulphate of copper, although he succeeded with all the others. Dupasquier has proved that it absorbs eagerly a large proportion of the alkaline sulphurets. Seven years ago Chevalier announced that the acetate and nitrate of lead, held in solution in water, wine, or vinegar, are removeable by carbon, either with or without the aid of heat. Very recently, M. Esprit has farther investigated this subject very extensively, and the results he arrives at are as follows. He finds that the acetate and sulphate of copper, the acetate, sulphate, and chlorate of zinc, the oxide of zinc dissolved in potass, the acetate and nitrate of lead, the acetate and nitrate of iron, the nitrate and sulphate of silver, the bichloride of mercury, the potassio-tartrate of antimony, the ammonio-chloride of silver, the nitrate of cobalt, the sulphate of cadmium, and the chloride of barium, are very eagerly absorbed by the carbon. He finds that the nitrate of copper, the sulphates of soda, potass, and magnesia, and arsenious acid, are very slightly separable. In dispensing medicines, and in the preparation of pharmaceutical compounds, carbon is incompatible with those substances which it thus appropriates and renders insoluble.

Adansonia Digitata a Substitute for Sulphate of Quinine.—A French physician of Guadaloupe, having been led by the high price of sulphate of quinine to endeavour to procure some other remedy against the intermittent fevers which prevail in that island, employed the bark of

the *Adansonia digitata*. The result of numerous experiments confirms the efficacy of this bark, which is of an agreeable taste, exerting little or no action on the nervous system, and is favourable to the digestive functions, at the same time that it is sold at a very moderate price. It has been found to be successful in some cases in which the sulphate of quinine had failed. A decoction is made by boiling one ounce of the bark in a pint of water, until it is reduced by one-third in quantity.

Novel mode of preparing Balsam of Copaiba.—The method of M. Lobel-André consists in saponifying the resin of balsam of copaiba, which thus holds the volatile oil of the balsam in solution, and by this process none of the important elements of the balsam are dissipated; on the contrary, they are all reduced to a state capable of being assimilated by the stomach of the patient, an advantage that can only be fully appreciated by those who are compelled to take this nauseous drug.

Discoloration of the Ointment of Iodide of Potassium.—The yellow discoloration to which this ointment is liable, the result of the separation of iodine by the fatty acids present in the lard, of which it is in great part composed, may be completely remedied, according to Dr. Briegers, by the employment of caustic solution of potassa. Two drops of this solution, he says, will preserve four ounces of the ointment from discoloration for one month, and will restore the white colour to that which has become yellow.

Test for Quinine.—M. Vogel has discovered the following test for quinine. Some drops of liquid chlorine are first added to a solution of quinine in alcohol or water, and afterwards a little concentrated solution of ferro-cyanide of potassium, when the liquid will assume a bright red colour. If the solution of the ferro-cyanide has not been sufficiently concentrated, the same effect is produced by adding a few drops of ammonia. For examination of quinine in a dry state, a small quantity of the substance is to be placed upon a watch-glass, and, whilst it is stirred with a glass rod, a few drops of liquid chlorine are to be added, and afterwards a little of the concentrated solution of the ferro-cyanide of potassium. A fine bright red is first produced, which soon subsequently changes to green.

Cannabine.—M. Dorvault describes this as an amorphous substance, of a greenish-brown or olive colour. When heated on platina, it liquefies, takes fire, and burns without residue. It has an aromatic and nauseous odour, and a pungent, acrid taste. It is soluble in ether, alcohol, and oils, but insoluble in water; and therefore a decoction or an infusion of Indian hemp (*Cannabis indica*) is not a good vehicle for administering this drug. Cannabine was employed by Dr. Villemin during the prevalence of cholera at Cairo, as was also the *Cannabis indica*, of which it is the active principle. It has been administered in the forms of pills and of tincture, the former being preferable to the latter. The tincture is made by dissolving one part of cannabine in nine parts of alcohol, and filtering after a short time. It may be administered in infusion of tea or of camomile flowers, and its action is rendered more certain by taking a good cup of coffee soon afterwards. The dose of cannabine is one-third or one-half of a grain.

Mettauer's Aperient Solution.—An American physician, Professor Mettauer, in writing on the subject of constipation, recommends in the highest terms the following composition:—

Socotrine aloes, ...	2½ ounces.
Bicarbonate of soda, ...	6 „
Compound spirit of lavender, . . .	2 „
Distilled water, ...	4 pints.

After macerating for a fortnight, the clear liquor may be poured off, or allowed to remain in the vessel in which it is prepared. He remarks, that age improves both the flavour and the efficacy of the solution. It should be administered about half an hour after dinner or supper, the usual dose being from one teaspoonful, increased to four or six. One small dose is frequently sufficient, if given at bedtime, diluting it with water, if preferred.

Bitter Taste of Quinine.—By combining quinine with tannic acid the bitter taste of the former may be completely concealed, whilst its efficacy remains unimpaired by the combination. One grain and a half of tannic acid will deprive ten grains of quinine of its bitterness.

Tooth Powders.—These, regarded as a means merely of cleansing the teeth, are most commonly placed among cosmetics; but this should not be, as they assist greatly in preserving a healthy and regular condition of the dental machinery, and so aid in perfecting as much as possible the act of mastication. In this manner, they may be considered as most useful, although, it is true, subordinate medicinal agents. By a careful and prudent use of them, some of the most frequent causes of early loss of the teeth may be prevented; these are, the deposition of tartar, the swelling of the gums, and an undue acidity of the saliva. The effect resulting from accumulation of the tartar is well known to most persons, and it has been distinctly shown that swelling of the substance of the gums will hasten the expulsion of the teeth from their sockets; and the action of the saliva, if unduly acid, is known to be at least injurious, if not destructive. Now, the daily employment of a tooth powder sufficiently hard, so as to exert a tolerable degree of friction upon the teeth, without, at the same time, injuring the enamel of the teeth, will, in most cases, almost always prevent the tartar accumulating in such a degree, as to cause subsequent injury to the teeth; and a floccid, spongy, relaxed condition of the gums may be prevented or overcome by adding to such a tooth powder, some tonic and astringent ingredient. A tooth powder containing charcoal and cinchona bark, will accomplish these results in most cases, and, therefore, dentists generally recommend such. Still, there are objections to the use of charcoal; it is too hard and resisting, its colour is objectionable, and as it is perfectly insoluble by the saliva, it is apt to become lodged between the teeth, and there to collect decomposing animal and vegetable matter around such particles as may be fixed in this position. Cinchona bark, too, is often stringy, and has a bitter, disagreeable taste. M. Mialhe highly recommends the following formula:—Sugar of milk, one thousand parts; lake, ten parts; pure tannin, fifteen parts; oil of mint, oil of aniseed, and oil of orange flowers, so

much as to impart an agreeable flavour to the composition. His directions for the preparation of this tooth powder, are, to rub well the lake with the tannin, and gradually add the sugar of milk, previously powdered and sifted; and lastly, the essential oils are to be carefully mixed with the powdered substances. Experience has convinced him of the efficacy of this tooth powder, the habitual employment of which, will suffice to preserve the gums and teeth in a healthy state. For those who are troubled with excessive relaxation and sponginess of the gums, he recommends the following astringent preparation :—

Alcohol, one thousand parts; genuine kino, one hundred parts; rhatany root, one hundred parts; tincture of balsam of tolu, two parts; tincture of gum benzoin, two parts; essential oil of canella, two parts; essential oil of mint, two parts; essential oil of aniseed, one part. The kino and the rhatany root are to be macerated in the alcohol for seven or eight days; and after filtration, the other articles are to be added. A teaspoonful of this preparation mixed in three or four spoonfuls of water, should be used to rinse the mouth, after the use of the tooth powder.

BLUE, GREEN, AND RED INKS.

C. Ohme recommends for the preparation of blue ink, one scruple of iron to be dissolved in aqua regia, the solution filtered, and the filtrate diluted with sufficient water to make eight ounces, which is to be mixed with four drachms of ferrocyanuret of potassium, previously dissolved in eight ounces of water, and the resulting precipitate collected on a filter. After all the adhering fluid has as far as possible run from it, the precipitate is to be treated with pure water, until the water passes through the filter of a blue colour, As soon as this happens, the funnel is placed on an empty cylinder, the filter pierced, and washed with as much pure water as will weigh 24 ounces. This latter solution of the precipitate constitutes the blue ink; and its formation is dependent on the property which the precipitate possesses of dissolving only in pure water, and not in solutions of other salts.

Green ink is to be prepared by rubbing one drachm of gamboge with one ounce of the above blue ink.

Red ink is to be made by macerating for two days, 6 drachms of powdered cochineal, 1½ ounces of pure carbonate of potash, with 16 ounces of water, in a porcelain dish. Then 4½ ounces of cream of tartar and 3 drachms of alum are to be added, and the fluid heated as long as carbonic acid is evolved. After the liquid has been filtered, the contents of the filter are to be washed in 1½ ounces of water, and then 1 ounce of alcohol added to the whole resulting fluid to keep it. For most purposes, 6 drachms of gum arabic should be dissolved in 16 ounces of this ink; but for confectionery, as a colouring agent, the addition of the gum is not necessary.—*Wittstein's Vierteljahresschrift.*

PHARMACEUTICAL HONOURS AND REWARDS.

In perusing the life of that able writer and philanthrophic man, Robert Southey, we met with the following passage, extracted from a letter addressed by him to Lord Brougham:—

"Neediness makes men dangerous members of society quite as often as affluence makes them worthless ones; I am of opinion that many persons who become bad subjects, because the world is not their friend nor the world's law, might be kept virtuous, by being made happy, by early encouragement, by holding out to them a reasonable hope in good time of an honourable station and a competent income, as the reward of literary or scientific pursuits, when followed with ability and diligence, and recommended by good conduct."

In applying this quotation to the little encouragement that is offered to the cultivators of pharmaceutical science in this country, we do not intend to cast the imputation, that pharmaceutical chemists are dangerous members of society or bad subjects, because we know there is not a more respectable and worthy class of men in the community; but to explain the cause why, as a class, science has received at their hands scarcely any development. Where, we would ask, is the reasonable hope in good time of an honourable station and a competent income, for the pharmaceutical chemist, who devotes his brain and toil to extend the boundaries of his science? The Pharmaceutical Society offers him no reward, and the public are indifferent to his skill. His experience soon teaches him, if teachable, that the chances of an honourable station and a competent income, are in an inverse ratio to the success and assiduity with which he cultivates science. Should the insatiable love of knowledge render him blind to the lessons of experience, he will soon discover that the world is not his friend nor the world's law.

To what causes are we to attribute this unhealthy condition of public opinion? Mainly, we would answer, to the ignorance of the public, on all kinds of knowledge of a technical nature. The public, however, generally acknowledge the acquirements of those men to whom their own compeers pay tribute. If this, then, be true, it is evident that unless the gifted pharmaceutist receives honours and rewards from his cotemporary pharmaceutists, he cannot expect the world's encouragement. Consequently, we indirectly ascribe the little progress that pharmaceutical science and education has made in England, to the non-conference of any rewards or honours by such societies as the Pharmaceutical one on those that deserve them. Even more than this,—we have heard many successful pharmaceutists,—successful, we mean, in a pecuniary sense,—make the blighting remark, that they "eschew scientific men, as they

never do any good for themselves." Good, with them, means making money; and science, the reverse qualification.

Whilst the Pharmaceutical Society on the one hand is boasting of its efforts to promote education, it does nothing, on the other hand, to make that education respected. Its organ trumpets aloud the advantages of educational progress, to invite youth within the portals of its school; and leaves him to discover that the boasted advantages, except so far as his own satisfaction is concerned, are nothing, absolutely nothing. In fact, he is disqualified for a successful career in his profession, because he relies on the knowledge he has acquired, instead of resorting to those ignoble arts by which success is generally to be secured. We therefore call on the Pharmaceutical Society to prove to the world that the advantages of education are real in a worldly sense, and not a mockery and a delusion. Until this be done, its precepts belie its practices. Its education is a chastisement instead of a boon.

Acts of Parliament may compel pharmaceutists to study sufficiently to pass the examination prescribed by them, but they will never incite men to cultivate habits and learn methods of original research. Therefore, if British pharmaceutists desire to remove the stigma that has been repeatedly cast upon them, of making no discoveries in their path of science, unlike their Continental brethren, they must stimulate those who possess the requisite talents to devote a portion of their time to these objects.

But we grieve to think that this stimulus will never be applied while British pharmaceutical journalism is in the hands of those who, from jealousy and other mean motives, fail to recognize merit however sterling in any members of the craft, from being rivals in the same vocation, namely, that of pharmaceutical chemistry.

But the truth really is, that a few British pharmacutical chemists have made discoveries in their art; but these journalists, with a characteristic malevolence, are oblivious of the fact, and would rather indulge in the unpatriotic act of libelling their countrymen in this respect, than to acknowledge the existence of the authors by pointing to their discoveries. Lord Chesterfield has said that "no man is a hero to his valet;" and so we suppose it is with many of our existing talented pharmaceutists. But Carlyle has very acutely observed, with reference to this remark, that "that is the fault of the valet," therefore, as often as we may hear British pharmaceutists decried and their merits ignored, we shall say that these things are the fault and show the ignorance of the valets of the pharmaceutical community—the governing body of the Pharmaceutical Society.

THE MODEL SCHOOL OF PHARMACY.

We can readily comprehend the forbearence—yes, even the supineness—exhibited by the members of the Pharmaceutical Society, respecting this model school and its abuses, and the amazing efforts that have been and are being made, to make the worse appear the better, by those who fatten on these very abuses. Individually, each member is only directly interested to the extent of his subscription, a small amount in comparison with the hundreds of pounds received by those who naturally strain every nerve to defend these abuses and to keep things in *statu quo*.

From an authenticated statement, read by the secretary of this Society before the parliamentary committee, we find that £.11,831 have been paid for lectures delivered in the school since its establishment; and the total amount of fees received from pupils attending these lectures has been £.1075; leaving a balance against the Society of £.10,756, or nearly one-fourth of its total income for eleven years, spent to maintain this expensive toy. We have purposely omitted adding to this outlay the cost of apparatus, &c., amounting to £.2159; and the rent of premises, amounting to £.3665, three-fourths of which are chargeable to the school, because a large portion of the latter expense must be set down to the cost of another branch of this model school, namely, its laboratories; and a portion of the former charged to the library and museum.

The expenditure for the laboratory has been, according to the same authority, £.4004, which does not include the cost of plant, but only the current expenditure; and the fees received from laboratory pupils amount to £.3357. In short, without troubling our readers with further details, it may be considered that, at the lowest estimate, the school has cost £.12,000 over and above the fees received from pupils. During the above period, 156 pupils have passed the major examination and received their diplomas. All of these have not been educated in the school; but to give the advocates of this school every advantage, we shall assume that 150 have been so educated. We shall thus find that every pupil, who has received the diploma, has cost the Society £.80 above that which he has paid for his education.

If the members of the Pharmaceutical Society would take the trouble to investigate this matter as we have done, they would be enabled to corroborate our facts and statements, although it would give them some trouble, as the accounts are studiously kept in a complex state, to avert these investigations, which are so damaging to those interested in maintaining intact this model school and all the absurdities connected with it.

Had the necessities of the pupils been such as to require that their education should have been for the most part gratuitous, or had there been no other educational establishments where the pharmaceutical chemist might have been qualified for his vocation, or had this model school been of a superior character, and offered such facilities for education as are not to be met with elsewhere, we should never have lifted our voice against its continuance. But when it is known that the pupils, as a rule, are in a better position to pay for their education themselves, than the majority of the members of this Society are enabled for them, out of their small incomes earned by unremitting toil; when it is an ascertained fact, that there are numerous schools in this country where chemistry and botany are, and have been for years, efficiently taught; and when it can be proved that the system of education pursued in the Pharmaceutical Society is vastly inferior to that of many of these establishments; are we not justified in asking, that the Society shall be relieved from that incubus—the model school?

In proof of our opinions we could cite many more facts, clearly showing the utter fatuity of those who uphold this school on the plea of its advantages and its necessity. Dr. Maclagen, an eminent professor of materia medica at Edinburgh, who was a witness called before the select committee on the Pharmacy Bill, by the persons who unscrupulously support this school, stated, in answer to the question of the chairman of the committee:—"In that case, do you think the institutions of Edinburgh would afford facilities for the proper education of pharmaceutical chemists?" Answer:—"I know they would." Of course they would, and do so at present, as the numerous able pharmaceutists in Scotland prove. Again, Mr. Mackey stated, in answer to a question put by the chairman, that the lectures at present delivered in Edinburgh were *exactly* suited for chemists. We would here inquire, If Edinburgh offers such facilities, why not Glasgow, Bristol, Liverpool, Leeds, Manchester, and above all, London? The answer is obvious; they do offer these facilities, and hence the non-necessity of the school in Bloomsbury Square; and had the committee called witnesses from these large provincial towns, they would have testified to that effect. There is also another important reason, concerning the well being of the pupils, why this school should not be encouraged and a monoply created in its favour; namely,—it is much better for the welfare of the student, both in a moral and economical point, that he should be educated, if possible, in the town where his family and friends reside, instead of being thrown into that vortex of vice, the greater metropolis, uncared for and uncontrolled. We could even prove, if it were needed, that several youths have had to date their ruin from their entrance into this model school. Again, in proof of our statement that there is no necessity for this

school, Mr. Bell, the chairman of the committee, asked the secretary of the Society the following question:—"Are there not institutions in Scotland (*medical schools*, for instance) where they might obtain an education, in case an act was procured making it requisite to pass an examination?" Answer:—"They have schools for that purpose?" We give these particulars, because we wish to draw the attention of our readers to the fact, that when it suits the purpose of some persons, they make one statement which they contradict when it does not further their object. We have seen published by this chairman, an attempt to ridicule the idea of medical schools educating chemists; but here we have a question put for the purpose of eliciting the answer that medical schools are competent for that object.

The secretary obligingly informs the committee, in answer to questions 988 and 991, that expense has been quite a secondary consideration with regard to this school, and we believe him, and that there was no desire on the part of the Council to accumulate money for any other purpose except the Benevolent Fund.

We very much question whether we ought not to have added the cost of the Pharmaceutical Journal, £.9826, to the expense of the model school, as it has been for eleven years nothing but one continuous clap-trap advertisement for the school. There is nothing surprizing in this result, when we consider that those who have had the lion's share of the £.12,000 have been from its commencement, and are still engaged in the management of this Journal. Men will naturally puff themselves, especially when they can do it free from cost.

We have now brought this crying abuse prominently before the members of the Pharmaceutical Society, and it only remains for them to express their opinions loud enough to reach the Council chamber of the Society to have such glaring evils remedied, for the Council is powerless without the tacit or active support of the members. It has too long legislated as if there were no such persons in existence as members. It would be well if they were for once to remind the Council of the fact of their existence.

A NEW CEMENT FOR JEWELLERY, &c.

Pieces of earthenware, and glass, gems, &c. may be firmly and neatly attached to metal or to one another, by means of common alum, which should be applied in a molten state to the parts which it is desirable to unite. This cement, when cold, adheres firmly, and any superfluous portions of it may be readily removed by water. It being white and partly transparent, joints of substances fastened with it are not readily perceived. It is much employed by French jewellers, but has the disadvantage of not resisting the solvent power of water.

MANUFACTURE OF NITRATE OF POTASH FROM NITRATE OF SODA.

According to Gentele, two vessels are placed over one another in this manufacture. The upper one contains a strong solution of nitrate of soda, and the under as much solution of potashes. When both solutions boil, the fire under the upper one is extinguished, and its contents run into the under vessel. Directly hydrated carbonate of soda precipitates, which is removed as long as it separates. The remaining solution is then poured into a crystallizing vessel, and treated in the ordinary way for obtaining pure saltpetre.

IODINE IN SARSAPARILLA.

Guillermond has detected in the ash left when sarsaparilla root was burnt, iodide of potassium. The root, treated with water previously to its combustion, yielded no salt of iodine, which shows that iodine exists in the root in a form soluble in water.——*Gazette Méd. de Lyons.*

THE MANUFACTURE OF PURE ACETIC ACID FROM WOOD VINEGAR.

BY DR. C. VÖLCKEL.

For the preparation of many salts, as well as for other purposes, it is important that an economical method of obtaining pure acetic acid from crude wood vinegar should be devised. I have instituted some researches both on a large and small scale to accomplish this object, and can recommend the following simple process as an effective one.

The crude acid is saturated with lime, without being previously distilled. A resinous body combined with lime is hereby precipitated, whilst a portion of this body remains dissolved in combination with the lime, and colours the solution dark brown. The liquid rendered clear by filtration, or decantation, is evaporated in an iron vessel. When it is reduced to about one-half, muriatic acid is added until the fluid is slightly acid, which is ascertained by cooling a small portion of the liquid and testing it with litmus paper.

By the addition of the muriatic acid, the greater part of the dissolved resin is separated, which collects into a mass, and may be easily removed by skimming. By the same means are decomposed compounds of creosote and other bodies with lime which are present in the solution, and which, being volatile, are dissipated during further evaporation. As these volatile bodies, in their free condition, react not at all or only slightly on litmus paper, a distinct reddening of this paper is an evidence that not merely the lime combinations of these substances, but also that a small quantity of acetate of lime is decomposed.

The quantity of muriatic requisite for this purpose varies according to the quantity of the crude vinegar, the strength of which is dependent on the moisture in the wood from which it is prepared. Twenty-four gallons of crude vinegar require from four to six pints of muriatic acid.

The solution of acetate of lime is then with great care evaporated to complete dryness, to drive off all volatile substances; this operation

is best concluded on a cast-iron plate. The volatile empyreumatic substances, as well as the resin, adhere with great tenacity to the acetate of lime, and pass over by distillation, when not previously expelled by heat, into the receiver, and communicate to the acetic acid a bad flavour. The drying of the acetate of lime must, under all circumstances, be continued until when cold it ceases to possess any or retains but very little odour.

After being thoroughly dried, the acetate of lime has a smutty brown colour. It is then fit for distillation, when mixed with muriatic acid, to obtain the acetic acid. This process can be well conducted in a copper still, with a cooling tube of lead, as with care the resulting acetic acid will contain neither lead nor copper. The quantity of muriatic acid required to decompose the acetate of lime cannot be given with precision; because this salt contains, in a variable proportion, chloride of lime and resin. In most cases, from 90 to 95 parts of muriatic acid, specific gravity 1.16, are necessary for the complete decomposition of 100 parts of acetate of lime, without the distilled acetic acid becoming strongly contaminated with muriatic acid. In any large operation, a previous research on the small scale would easily determine the quantity of muriatic acid necessary. The operation can also be conducted so that an insufficiency of muriatic acid shall be employed in the first instance, more being afterwards added, until nitrate of silver produces a turbidity in the product, which is an infallible test of the completion of the decomposition.

The distilled acid possesses a very slight empyreumatic odour; it is colourless, and gives with nitrate of silver no precipitate when muriatic acid is absent. Its specific gravity is between 1.058 and 1.061. It contains about forty per cent. of anhydrous acetic acid. The acid thus produced may be rendered quite pure by distillation, with two or three per cent. of bichromate of potash. It is then quite free from smell, mixes with strong sulphuric acid without discoloration, and when boiled with nitrate of silver and excess of ammonia, gives no trace of reduced silver. Its purity may be further established by saturating it with oxide of lead, and evaporating the clear solution which, when cold, gives beautiful crystals of acetate of lead.——*Liebig's Annalen.*

PREPARATION OF PURE QUININE.

When so many salts of quinine are as at present employed for medical purposes, which require pure quinine in an uncombined state for their preparation, it is important to know the best means by which this alkaloid can be separated from the disulphate pure, and with as little loss as possible.

The following method is founded on a well ascertained fact,—that while quinine is soluble in caustic potash and ammonia, it is insoluble in caustic soda. Take any quantity of disulphate of quinine, and dissolve it in twenty times its weight of distilled water, with the aid of a few drops of diluted sulphuric acid. Drop into this solution, until it has a slight alkaline reaction, as much solution of caustic soda as is necessary, and until a portion of the fluid filtered from the precipitate gives no turbity upon the addition of a few drops of the soda solution. The

precipitate is collected on a filter when it has settled, washed with distilled water, and then dried in a gentle heat. Ten parts of disulphate of quinine yield seven parts of quinine, consisting of C_{20} H_{12} N O_2 + 3 H O.

The quinine thus prepared is a snow-white, fine crystalline powder, without odour, and very bitter. It browns moistened turmeric paper. In the heat it melts and loses its water of crystallization, and upon cooling becomes a resinous transparent mass. It is very slightly soluble in water, but easily soluble in alcohol. Ether dissolves $\frac{1}{60}$th part of quinine. When rubbed with chlorine water, and afterwards upon the addition of caustic ammonia, a dark green flocculent precipitate ensues, which is very characteristic of quinine.

SOME REMARKS ON POTASH OR SOFT SOAP.

BY DR. G. C. WITTSTEIN.

It is well known that soda soap will not dissolve in a solution of alkaline salts, and that the attempted separation of potash soap from its solutions, by means of common salt or sulphate of soda, produces a soda soap by double decomposition; and therefore it is impossible, by the methods employed in the manufacture of soda soap, to make potash soap*.

From the great analogy which exists between soda and potash compounds, it would be expected that potash soap would be separated from its solutions by potash salts. However, this is not the case, as when to a solution of potash soap, which has been obtained by boiling fats with a solution of caustic potash, a considerable quantity of chloride of potassium has been added, the separation of the soap does not follow; the salt dissolves in the soap, and the solution remains clear.

From this result it is evident that it is impossible, as in the ordinary process of making soda soap, to separate potash soap, as such, by the aid of salts. The only way, therefore, to prepare potash soap from fats and caustic potash is to evaporate its solution to dryness, by which a sort of extract-like substance is obtained, containing glycerine and other impurities.

When a pure potash soap is required, it can only be made by the direct union of the oily acids with caustic potash, and not by the saponification of oils†.

* For these reasons nearly all the potash soap sold to chemists, as being the article ordered by the London Pharmacopœia, is imperfectly prepared, containing soda, glycerine, &c.——*Editors of the "Annals."*

† Dr. Wittstein is in error here, as a pure potash soap can be separated from its solutions and from glycerine, when made in the ordinary way, by a concentrated solution of caustic potash, in which it is insoluble. The best method to make the potash or soft soap of the London Pharmacopœia is to boil olive oil with a sufficient quantity of a solution of caustic potash until it is saponified; then to concentrate the solution by heat in a water-bath, and afterwards to add a strong solution of caustic potash to it, when the potash soap will float on the surface, if the solution be sufficiently strong, and may be removed. By placing the soap in a funnel, the excess of caustic alkali and glycerine will drain from it. By this method an excellent soap, of a clear, gelatinous appearance, is obtained.——*Editors of the "Annals."*

TINCTURE OF GUAIACUM A TEST FOR THE PURITY OF QUICKSILVER.

BY SCHÖNBEIN.

When about four ounces of quicksilver or of any other noble metal, in a divided condition, are shaken with from four to six drachms of tincture of guaiacum, in a bottle containing oxygen or atmospheric air, the resinous solution appears, after a few seconds, of a deep blue colour, as when it is treated with chlorine, ozone, or superoxide of lead.

When the same experiment is performed with readily oxidizable metals,—as zinc, cadmium, tin, bismuth, iron, antimony, arsenic,—the guaiacum tincture does not become blue in the least, however long it may be shaken with them. But when the tincture rendered blue by any means is shaken with the powder of any of the above oxidizable metals, it is quickly deprived of its blue colour by these metals extracting the oxygen from the blue guaiacum.

When quicksilver contains only a small quantity of zinc, lead, &c., it decolorizes the blue tincture when the metal is strongly shaken with it. The rapidity of this result depends upon the degree of contamination of the quicksilver with the oxidizable metals.

From the foregoing statement the remarkable fact is explained, that sometimes quicksilver decolorizes the blue tincture of guaiacum in the beginning, but by the continuance of the shaking in this air, it is again coloured blue. When the quantity of oxidizable metals in the quicksilver is very small, then the oxygen in the blue tincture is sufficient to oxidize these metals, and to separate them from the quicksilver. When this case happens, the pure quicksilver acts on the oxygen, and as a consequence the decolorized tincture is again rendered blue.

It therefore follows, that quicksilver which does not blue by shaking in the air the fresh tincture of guaiacum, or which decolorizes the blue tincture, is not pure and contains an oxidizable metal.——*Journal für Praktische Chemie.*

THE DETECTION OF SPIKE OIL AND TURPENTINE IN LAVENDER OIL.

BY DR. J. GASTELL.

There are two kinds of lavender oil known in commerce; one, which is very dear, and is obtained from the flowers of the *Lavendula vera;* the other is much cheaper, and is prepared from the flowers of the *Lavendula spica.* The latter is generally termed oil of spike. In the south of France, whether the oil be distilled from the flowers of the *Lavendula vera* or *Lavendula spica*, it is named oil of lavender.

By the distillation of the whole plant or only the stalk and the leaves, a small quantity of oil is obtained, which is rich in camphor and is there called oil of spike. Pure oil of lavender should have a specific gravity from .876 to .880, and be completely soluble in five parts of alcohol of a specific gravity of .894. A greater specific gravity shows that it is mixed with oil of spike; and a less solubility, that it contains oil of turpentine.

THE FORMATION OF NITRIC ACID.

By a series of researches which are detailed in the Transactions of the Royal Society, Dr. Bence Jones, has arrived at the conclusions that the action of oxygen extends, within the animal organismus, not only to the hydrogen, carbon, sulphur, and phosphorus, but also to the nitrogen; that by all processes of combustion within and without the animal organismus, when ammonia is present, it is partly converted into nitric acid, and that the nitrogen of the atmosphere behaves by no means indifferently in the ordinary process of combustion, but contributes to the formation of small quantities of nitric acid.

Dr. Bence Jones, has previously shown that when ammonical salts are taken, nitric acid is afterwards found in the urine.

ON TRIMETHYLAMINE.

BY PROFESSOR HOFMANN, PH. D., F.R.S.,

Royal College of Chemistry.

At a meeting of the Paris Academy of Sciences, July 12, M. Dumas, read a communication from Dr. Hofmann, announcing the identity which exists between the substance called *trimethylamine* and the liquid which runs from salted herrings.

The following is a *resumé* of this communication:—

Whilst investigating the ammoniacal bases of the methylic series, Dr. Hofmann expressed the opinion that the base, described by M. Wertheim under the name of amylamine, or of propylamine, would be found to be identical with trimethylamine.

The observation, due equally to M. Wertheim, that this substance is found, in somewhat considerable quantities, in the liquid which gradually oozes from salted herrings, was made the starting point of some experiments, having for their object the solution of this question by direct experiment. Mr. Henry Winckles, who, at the request of Dr. Hofmann, investigated this subject, has ascertained that it is trimethylamine which constitutes the predominant substance in the mixture of several bases which furnishes the juice obtained from salted herrings.

The identity of this substance with trimethylamine synthetically prepared, by the investigation with which Dr. Hofmann is at present occupied, has been ascertained, not only by the direct comparison of these two bodies, but also by the reaction of the methylic iodide. With this last, the base in question immediately furnished a crystalline magma of iodide of tetramethylammonium. One inference to be drawn from this result is, that it appears more than doubtful that, up to the present time, we have not obtained the veritable propylamine. For the same reason will be understood the necessity of demonstrating, by experiments, how far we are authorized in giving to petinine the name of butylamine, a name which several chemists have given it during the last few years.

The manner in which this body acts with the methylic or ethylic iodide, would furnish a solution of this question without any difficulty.

THE NON-EXISTENCE OF DONARIUM.

Bergemann some time since announced the discovery of a new elementary body, which he termed donarium, from a Norwegian numeral. Dumas and Berlin have re-examined this mineral, and find that the substance which Bergemann mistook for a new metal is an old element, discovered by Berzelius in 1830, namely, thorinum; and the analyses of these chemists show that orangite, the so-called new mineral which Bergemann examined, is a pure specimen of thorite, the mineral from which Berzelius obtained thorinum.——*Poggendorf's Annalen.*

ON THE DETECTION OF POPPY AND OTHER DRYING OILS IN ALMOND AND OLIVE OILS.

It is known that the olein of the drying oils may be distinguished from the olein of those oils which remain greasy in the air by the first not being convertible into elaidic acid, consequently it does not become solid. Professor Wimmer has recently proposed a convenient method for the formation of elaidin, which is applicable for the purpose of detecting the adulteration of almond and olive oils with drying oils. He produces nitrous acid by treating iron filings in a glass bottle with nitric acid. The vapour of nitrous acid is conducted through a glass tube into water, upon which the oil to be tested is placed. If the oil of almonds or olives contains only a small quantity of poppy oil when thus treated, it is entirely converted into crystallized elaidin, whilst the poppy oil swims on the top in drops.

IODINE IN COAL.

In the coal obtained at Obernkirchen, in Schaumburg, Graf has found an appreciable quantity of iodine, which he detected by moistening the coal with caustic potash, then burning it to an ash, washing the ash with water, and evaporating the resulting filtered liquid to dryness. The residue was treated with alcohol, which was evaporated. What now remained was brought in contact with starch paper, which was afterwards placed in a stream of chlorine. The characteristic evidence of the presence of iodine was thus obtained.——*Archives der Pharmacie.*

EXTRACTS FROM THE EVIDENCE ON THE PHARMACY BILL, DELIVERED BEFORE THE SELECT COMMITTEE OF THE HOUSE OF COMMONS.

Sir *Benjamin Brodie*, Bart., called in, and examined.

Chairman.] I believe you have devoted considerable attention to the laws relating to education in the medical profession?—Yes, a good deal.

In your investigation of the subject, have you considered the education of those who dispense medicines, as well of those who prescribe them?—I have not omitted it altogether, but it has not been the matter which I have principally considered.

Do you consider that medical education would be complete, and answer the purpose

required, if no provision were made for the qualification of those who execute the orders of medical men in reference to making up medicines?—I think it is very desirable that the public should have the means of distinguishing those who have been found to be well qualified for that business from others.

Do you consider that division of labour in the profession is desirable; that there should be a class of persons devoting their almost exclusive attention to chemistry and the manufacture of medical substances?—Not only desirable but very important.

Do you think that where persons are engaged in the medical profession the tendency is rather to neglect pharmacy; that they have not time to attend to both?—I should think that a person who is much engaged in practice, as an apothecary, would not have much time to attend to, or much opportunity of studying the manipulations of pharmacy, or the science of chemistry.

Then I presume you would consider that there ought to be a class of persons for those purposes, who do not practise as medical practitioners?—I think it is quite necessary that there should be; and indeed that we could not do without such a class of persons.

Do you think that that class of persons ought to pass an examination?—It seems very desirable that they should.

Do you think that those examinations should be conducted under the jurisdiction of a body of pharmaceutical chemists?—It is desirable that they should be conducted by some persons who are perfectly competent to conduct them, and these must be such as are acquainted with pharmaceutical chemistry.

Do you think that persons brought up in that particular department, and properly educated, and practised in it, would be more qualified for that office than men who had devoted their chief attention to the practice of medicine and surgery?—I should think so.

Are you aware of the proceedings of the Pharmaceutical Society, and of the objects with which it was established?—Yes, I have a general knowledge of them.

Do you think that object was a good one, namely, that of the improvement of the qualifications of pharmaceutical chemists?—Yes, I think it was a good one.

Do you think it has already done any good in drawing attention to education in that department?—Yes, I believe it has done good; I imagine it must have done good, because I see that chemists advertise themselves as being licensed by the Pharmaceutical Society, and I suppose that their licence must be considered as showing that they have been found qualified.

In the establishment of a new Society and a new system, by Act of Parliament, is it not usual to grant some indulgence to those already in business; that the Act cannot be made retrospective?—It always has been so, and it cannot be avoided. It was so done by the Apothecaries' Act; all apothecaries who were in practice having been considered to be licensed practitioners, though they had passed no examination.

Do you see any objection to entrusting the Pharmaceutical Society, as a body representing the chemists and druggists, with the examination of the future members of that body?—I have not considered the subject very particularly; but I am not aware that there is any objection to it under proper regulations.

If there were a provision that the College of Physicians and the College of Surgeons might, respectively, if they thought proper, depute a member of each of their bodies to attend the examinations, would that be a satisfactory regulation to those two bodies?—It seems to me, if care was taken that very proper examiners were appointed, it would not be necessary, and I should not insist upon it.

Then you do not conceive that it would be absolutely necessary?—I think that if the Pharmaceutical Society were so constructed as to form in itself a competent Board, that sort of supervision would not be necessary.

In the commencement of a Society, as a general rule, would you expect to find it perfectly competent in every respect, or would you think that it would be imperfect at first, and gradually improve as education advanced?—Of course it would not be so perfect at first as afterwards; and I suppose like all other human institutions, it would never be absolutely perfect.

Though you found imperfection to exist in it as a young institution, would that be, in your opinion, an objection to granting powers to the body?—No; care being taken that the imperfections are removed.

With respect to restrictions on unqualified persons, do you think it desirable to

introduce a law restricting any person from following the business who has not passed an examination, on the same principle that a similar restriction existed with the College of Physicians?—My own opinion is that it would be sufficient; and that all that could really be done, and ought to be done, would be to give the public the opportunity of distinguishing between qualified and unqualified chemists. I do not think that it would be possible to hinder other persons from dispensing medicines.

Then you think it would be sufficient if they were prohibited from calling themselves pharmaceutical chemists, or fitting up shops which would attract the public eye as chemists' shops, exhibiting the insignia and emblems of pharmaceutical chemists?—I should be rather for not making any restriction, as far as I see at present, except that there should be the means of the public knowing who are the persons properly qualified. As in the medical profession, I have said always, that you cannot interfere with the public employing whom they choose to employ, but that the public should have the means of knowing what persons are properly instructed, and what persons have been properly examined.

Then, if there is a provision in the Bill prohibiting persons from pretending to be what they are not, so as to give the public the opportunity of knowing who are qualified and who are not, that is as much as the Legislature should do?—I conceive that it would be quite sufficient if there was a provision to prevent those who had not been educated and examined by the Pharmaceutical Society, or by the members of the examining Board, whatever it might be, from saying they had been so examined, or from assuming that they had the licence of the Board.

Mr. Ewart.] Or from assuming a title which might induce the public to believe that they had been so examined?—Yes.

Chairman.] Do you believe that an Act giving that distinction to the Pharmaceutical Society, and those who have been examined by it, woul tend to improve the character of the body?—I think that an Act which enabled the public to distinguish from others, those who had been properly educated under the direction of the Pharmaceutical Society, or whatever other body might be employed for that purpose, and properly examined by them, would answer every good purpose.

Would not that, by increasing the respectability of the body, induce a superior class of persons to bring up their sons to the business?—Certainly it would.

Is not the business of a pharmaceutical chemist one which requires a certain amount of preliminary education?—Yes; and a good deal of scientific knowledge to conduct it properly.

Do you think that a Bill which increased the respectability of the body, and would go to improve the character of the body of pharmaceutical chemists, would operate to induce a superior class of persons to bring up their sons to the business?—I think it desirable that no person should be brought into it who is not well acquainted with chemistry.

But if a person could not afford to send his son to a suitable school, would it not be an objection to his becoming a chemist and druggist?—It requires a knowledge of Latin, at any rate, and a moderately good education generally, for a youth to become a good pharmaceutical chemist.

Therefore it would be impossible to elevate the character of the body without introducing this superior system of education?—I think so.

Do you think that the education of chemists and druggists in chemistry and pharmacy, and giving them a status as pharmaceutical chemists, would tend to induce them to become illegal practitioners?—No, I should think it would rather prevent them. I do not believe that the higher class of chemists are disposed to become medical practitioners, though the inferior chemists may be disposed to be so.

Then do you think that the tendency to encroach upon the medical profession is inversely to the qualification in pharmacy and chemistry?—I think so; I think it is only the inferior chemists who do so encroach.

Then I may infer from that, that you do not think it would increase the evil which is complained of?—I do not think it would increase the evil.

But rather tend to diminish it?—It would not prevent it altogether; it cannot be entirely prevented.

Mr. Bouverie.] I understand that you contemplate, as a public advantage to be derived from giving a statutory existence to the Pharmaceutical Society, that

the public would have some means of recognizing who had been examined and who not?—Yes.

Then you would not prohibit the sale of drugs by anybody, but you would prohibit anybody from assuming the title of pharmaceutical chemist?—I do not believe you can prevent the sale of drugs by unlicensed chemists, any more than you can prevent unlicensed practitioners with respect to medicine.

But you would prohibit anybody assuming a false title, implying that he had been examined?—Yes.

Mr. Hindley.] You would make a broad distinction between a mere drug vendor and a scientific chemist and druggist?—Yes; I think the public should be enabled to distinguish between a common drug vendor and a scientific chemist and druggist, and that this would do a great deal of good; I do not think you can do any more.

Mr. Jackson.] Do you think this bill has a tendency to carry that out?—I have not studied the Bill with this particular object in view; but so far as I can see, I think it has that tendency, and I do not know any better plan that could be tried; but I say this without much study of the provisions of the Bill.

Sir W. G. Craig.] Mr. Savory has stated, that it is his opinion that no drug should be allowed to be sold except by a person who has received a licence from the Pharmaceutical Society. You do not agree with that?—I do not think it could be done any more than the preventing unlicensed medical practitioners. The public will buy drugs where they like, and get medical advice where they like.

Mr. Ewart.] You think it would be sufficient to enable the public to judge for themselves?— Indeed it seems to me that the public ought, in such matters, to be able to protect themselves.

Mr. Bouverie.] Should you think an inspection of the drugs of those examined persons desirable?—There is an inspection now, I believe, by the College of Physicians, and by the Company of Apothecaries; I do not know how it works, or whether it does good; I understood that they sometimes fling away bad drugs.

Mr. Ewart.] Is there any superiority in the chemists in the City of London over the chemists in the other parts of London?—I believe not.

I ask the question, because it is the City which is under the superintendence of the College of Physicians?—I do not know that there is any difference.

Chairman.] I believe your body, as surgeons, do not profess to interfere at all with regard to drugs?—We have no power to do so.

You leave that to the College of Physicians and the Apothecaries?—Yes, but our prescriptions very often suffer from the badness of the drugs.

Do you think that the chemists in this country are sufficiently educated?—As a body, certainly not.

Do you think that some legislation ought to take place, with a view to remedy that defect?—I do.

Mr. Bouverie.] As I understand, the footing on which you would put the chemists, is very much the same as that of the surgeons?—Yes.

Mr. Ewart.] Is not this measure of reform necessary to complete the course of examination which exists in other parts of the medical profession?—Yes, I think it is.

A doctor of medicine is examined previously to obtaining his diploma, and a surgeon is examined previously; why should not a chemist be examined previously?—Exactly; and I think that those examinations would be more useful in fact than the examinations of medical practitioners, because the candidates cannot be crammed for them; whereas candidates get crammed for medical examinations to a very great extent, especially for those by the Apothecaries' Compony; but I do not believe they could be crammed for this examination, because they might be required to manipulate, and to distinguish the different drugs and chemicals, at the time of examination.

Have foreign chemists an advantage over English chemists in scientific knowledge general and qualifications?—I think on the whole, that there are more scientific men among the French pharmaciens than among the English chemists.

Sir H. Willoughby.] I understand that you limit your views to the formation of some society, pharmaceutical as it is called here, which should have the power of examining parties who wish to call themselves pharmaceutical chemists?—Yes.

You have no idea of conferring the power of selling drugs upon a specific class

of people in this country?—I am against a monopoly, but I think that the public ought, as I said before, to have an opportunity of distinguishing between the real chemist and the pretender.

You would not advise a monopoly?—No, I should not.

Do you believe anything of that kind to be possible?—I believe it to be impossible.

Then how would you constitute that society of pharmaceutical chemists which is to have the power of examination?—That is a wide question; I have not thought of the subject enough to answer it; I know of no body that at present in this country is at all qualified to undertake the duty except the Pharmaceutical Society; perhaps a better one might be formed, but I am not aware that there is any other at present.

But the whole of the improvement which is contemplated will depend upon the fact of their being an efficient body?—Yes.

Do you know what is the composition of the present Pharmaceutical Society?—I know it generally; especially that some of the best chemists in London, and the most scientific of them, belong to it, and take an interest in it.

It is a voluntary association of certain individual chemists?—I believe so.

That is the foundation of it?—Yes.

That society is to have the power of making laws under which parties are to be examined?—Yes.

Then by their act could they exclude any people they pleased?—I think it ought to be with that society as it is with our College of Surgeons. When the Crown granted a new charter to our college, the college was placed under the supervision of the Secretary of State. The bye-laws of the college are of no avail till they are sanctioned by the Secretary of State; so it ought to be with any public body that is entrusted with a great public duty.

Would not the provisions which you have alluded to be a *sine quâ non* in your mind when forming such a society?—I think if the society is employed for public purposes, it ought to be responsible to the Crown for the mode in which its office is performed.

Then you would not entrust such a body with a legislative power?—I would entrust them with the power under the supervision of the Secretary of State.

That is, that if they had such a power there should be a supervision of that power by the Secretary of State?—Yes.

Do you suppose it possible in any way to make such a society a representative body so as to represent generally the chemists of Great Britain?—I am not certain that it would not be better if, in all these cases, the examining Board were merely nominated by the Crown: but I think public opinion would make it difficult to carry that principle out.

At the present moment this Pharmaceutical Society is composed of a certain self-elected body of gentlemen exercising the trade of chemists and druggists?—Yes.

They are in no way a representative body?—I suppose they represent the profession of chemists, and I conclude that the council of the Pharmaceutical Society is elected by the general body.

THE LEECH TRADE.

To the Editors of the "Annals of Pharmacy and Practical Chemistry."

GENTLEMEN,

I beg to call your attention to this important article of commerce, and to inquire what are the causes of the high price of leeches being kept up, so much to the disadvantage of the trade and the injury to the public in particular.

Is there a system of monopoly? I know not; but it savours strongly of the existence of such a thing, from the supply being so nicely regulated as to maintain high prices. Now, if this really be a fact, and that there are only a few persons who have agents abroad, who send merely small parcels home, I would suggest the propriety of some of our wealthy drug houses sending out agents also to Smyrna, Gibraltar, Hamburg, and other places, whence they are supplied; which step would be quite in accordance with the present movement and and advantages of free trade, by throwing

open that which has hitherto been confined to the few, and thereby enabling leeches, like other marketable commodities, to be supplied plentifully and cheaply.

Every druggist knows what loss there is in keeping up a stock of leeches; and as the medical men do not keep them generally, but are supplied through the druggists, it becomes a serious evil to them to have to pay 32s. per 100, when formerly they were sold at a fourth of that price. I would urge this suggestion more strongly on account of the non-success attending the breeding of leeches, which might otherwise obviate the dependence on supplies from abroad.

I am, GENTLEMEN,

Yours respectfully,

JOHN TUFF.

ENFIELD, *August* 18, 1852.

TO CORRESPONDENTS.

A Subscriber, Wolverhampton.—According to the provisions of the Pharmacy Act, no persons, however experienced, can enter the Pharmaceutical Society, except by examination. This grievance can only be remedied by the interference of the legislature. We are not disposed at present to encourage any attempt to establish another society. If the changes were effected which are so desirable, we should cordially support the original institution, for many reasons; but we fear it will not be reformed until it will not be worth reformation.

G. T., Bridgend.—There is a small work by Liebig, published in Griffin's Scientific Miscellany, that would meet the views of our correspondent in every respect. It would require two numbers of this journal to give the necessary information on organic analysis.

A Few Apprentices of Manchester.—We should advise you to study Faraday's "Chemical Manipulation," where you will find plenty of chemical experiments. We will endeavour to meet your wishes in the way mentioned.

C. G. S., Sheffield.—1. The price of Thompson's "London Dispensatory" is one guinea. 2. Balfour's "Manual of Botany," or Lindley's "School Botany."

Verus, Liverpool.—The treacle or sugar cannot be dispensed with, or else the salt of iron will be speedily peroxidized.

W. D. T.—Specific gravity, and the quantity of cream found when the milk is allowed to stand, will indicate whether it has been adulterated with water. It is unnecessary to look for chalk, as it cannot be applied for adulteration on account of its density.

A Hater of Nepotism and Sectarian Cliques.—Your offer would not be the slightest assistance to us. It is not money that is wanted, but men of action and spirit, who would boldly come forward and face the actors in this drama of corruption. We take this opportunity of thanking you and many others, for the expressions of sympathy and encouragement that we are constantly receiving, for our efforts to unmask a set of men banded together by a wicked desire, and a too successful attempt, to plunder a public institution under the guise of disinterested zeal.

J. B. N.—1. Sea-water can be distilled on a small scale, and be rendered brisk by impregnation with carbonic acid gas. 2. Oil of Gallipoli is an inferior description of olive oil.

G. Brown.—If creosote changes colour by being kept, it cannot be pure.

Vindex, London.—When men cannot refute charges brought against them, they retaliate by vulgar abuse. The rage of the persons alluded to is such that they cannot retain it within the bounds of decency.

G. G. G., Birmingham.—Men without ability, wealth, or good position, could never get on the Council except by the influence of those who bring them on to use them as puppets, that is, to vote any way their patrons direct.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

ON PRACTICAL PHARMACY.

BY JUSTUS LIEBIG.

Professor of Chemistry at the University of Giessen.

No. IX.—Conclusion.

Operations which have for their objects Mixture and Separation of the second degree.

Precipitation is the name applied to the process which takes place when a solid body, in the form of a powder, and mostly without a crystalline structure, is thrown down immediately, or after a short time, from a fluid, by cooling, by the action of the air, or by the addition of another fluid or even a solid substance. The body, which causes the precipitation, is named the precipitant, whilst that which is precipitated, is called the precipitate or magisterium, and when it swims on the fluid, it is termed a cream; the precipitate is either a product or an educt. It is termed the former, when the precipitant, or a portion of it, combines in a solid form with a portion of the substances to be precipitated, as by mixing a solution of acetate of lead with sulphuric acid, or a solution of sulphate of magnesia with carbonate of soda. It is an educt, when the precipitant combines to form a fluid with one portion of the compound to be precipitated, whilst another portion is thrown down, as by adding caustic potash to a solution of sulphate of magnesia. Many substances fall from their solutions when exposed to the atmosphere; then either the menstruum escapes, or the precipitant is absorbed from the air, as in the cases of carbonate of lime dissolved in water by means of carbonic acid, and lime water when exposed to the air.

In ordinary cases of precipitation, the following rules must be observed:—The fluid to be treated, as well as the precipitant solution, must be quite clear, and if not, they must be filtered. The vessel in which precipitation is to take place, should be cylindrical, of greater height than breadth, and so large that the mixture only three parts fills it. Precipitants and solutions to be precipitated, should be somewhat dilute, so that the precipitate may fall in a finely divided condition and flocculent, and also that the salts contained in the solutions may

not crystallize out of them. But care must be taken not to dilute the solutions too much, as some precipitates are slightly soluble, and a portion of them would in consequence be lost.

The precipitant should be added by degrees in small quantities to the solution, with constant stirring or shaking, to increase the points of contact, and to prevent, in some cases, the liquid running over by effervescence. The liquid should be tested from time to time, to ascertain if enough of the precipitant has been added, which is to be accomplished by filtering a portion of the liquid, or by removing a clear portion of it, and adding thereto some of the precipitant. If nothing now falls therefrom, enough of the precipitant has been employed.

When the whole of the precipitate has been collected and washed, it should be dried in the air, or, according to its nature, in a gentle heat. Many precipitates coagulate when they are long diffused in the fluid, and soon partake more or less of a crystalline texture. In a medicinal point of view, this change is often detrimental, therefore, they should be removed as quickly as possible from the fluid. Precipitates can be dried rapidly between folds of blotting paper, which paper must be renewed as soon as it becomes wet; or they can be dried by being placed on porous tiles, which rapidly absorb their moisture. By this latter means, very flocculent precipitates may be obtained in a dry state.

Metallic precipitation is distinguished from the former by the metallic body adhering frequently into masses when precipitated. This process is conducted both in the dry and wet way. In the former way, precipitation happens when a metallic mixture, as a metallic sulphuret, is melted with a body, which will combine with the substance with which the metal is mixed, whereby it becomes separated. In the latter way, precipitation results when the solution of a metallic salt is brought in contact with another metal, which becomes oxidized and dissolved; whilst the metal of the salt is precipitated in various forms, sometimes as a powder, and sometimes in the form of a tree. Coagulation is also a kind of precipitation, which takes place either by heat alone, as in albuminous solutions, or by the addition of another body, as in the case of milk, when the curd is separated.

Efflorescence is a name applied to the breaking up of solid coherent bodies, as salts, into powders, by the action of dry warm air. This happens with sulphate and carbonate of soda placed in a dry atmosphere, whereby they lose their water of crystallization, and fall into powders.

When salts which contain much water of crystallization, and retain it at ordinary temperatures, are to be deprived of their water, they must be heated. This process is called calcination. Salts are heated in a gradually increasing temperature until they cease to lose water. In the beginning they melt in their water of crystallization and then become dry again, when they frequently swell and form a porous mass, as in the case of burnt alum. Sometimes, when the heat is too long continued, the salt is decomposed.

When, by heat, a salt jumps with a crackling noise, because water is enclosed in its interstices, and which is converted into steam by the heat, the phenomenon is called decrepitation.

Incandescence, or heating bodies to redness, is applied to separate

volatile substances from non-volatile ones, as carbonic acid from lime or magnesia. This operation is also called calcination, and is further employed for combining volatile substances with non-volatile bodies, as for example, sulphur with lime or iron, and to render hard, non-volatile substances brittle, as flints, so that they can be powdered. When red hot, they are thrown into cold water for this purpose.

One of the most important chemical operations is oxidation, that is, the combining of oxygen with other bodies, which was in former times called calcination. This process is effected in many ways and requires a special knowledge of chemistry, and therefore cannot be treated of here at length. When accomplished in the wet way, it involves solution, as when phosphorus is oxidized by nitric acid. Frequently oxidation is accomplished by the aid of heat, and is also attended with the evolution of heat, it is then termed combustion, which combustion, when extremely rapid and accompanied with a loud noise, is further called detonation.

For the same reason, as with reference to oxidation, reduction cannot be here entered upon in general. It consists in the separation of oxygen from other bodies. Metals are reduced in the wet way by precipitation with other metals, as previously explained. In the dry way, they are generally reduced by mixture with charcoal or bodies containing carbon, and exposure to a red heat.

Fermentation is a remarkable chemical process, which organic bodies, in combination with water, undergo, when subjected to certain temperatures, partly under the influence of the air. It is divided into vinous, acetic, and putrefactive fermentations, which are seldom employed by the pharmaceutist.

Carbonization of non-volatile organic bodies is an operation which requires a strong and continued heat. The body to be carbonized is placed in a vessel which, for the greater part, excludes the action of the air on it, and heated strongly until it ceases to evolve gaseous matters; the residue is carbon. When the volatile bodies are collected by means of a receiver, this operation is called dry distillation.

Incineration is the complete combustion of an organic body in the presence of the air, when a non-volatile and incombustible substance remains, which is termed an ash. This process was formerly much employed by pharmaceutists to obtain potash and soda, by burning various plants rich in these substances.

There are many other operations performed by the pharmaceutist besides those previously described, but as they belong especially to chemistry, they may, in this treatise, be omitted.

On Lutes.—In chemical operations, lutes are frequently necessary, which are of different kinds, according to the description of vessel to which they are to be applied, the nature of the substance to be treated, and the heat to which they are to be exposed. The knowledge of these particulars is important for the pharmaceutist.

Starch jelly, thickly prepared in the ordinary manner, serves as a lute for many kinds of distillation. It is applicable with strips of paper to the joints of the apparatus. Pieces of bladder are useful to fasten retorts to receivers. They should be firmly bound to the joints with string. Strips of sheet Indian rubber form a most valuable

lute to connect tubing together, or tubes with flasks, or any kind of pneumatic apparatus. The Indian rubber should be placed in hot water, after being cut of the size necessary. When this has been done it should be immediately bound round the tubing, and the recently cut edges brought into apposition, when they will unite and form a tube impervious, where united, to gases. Almond powder, flour, and linseed meal are serviceable as lutes. They may be mixed into a paste with water, or with the white of eggs. Clay is frequently employed as a lute, especially for operations on a large scale. Chalk and linseed oil or putty forms a lute which resists the action of moisture. A lute which dries rapidly and adheres firmly, can be made by mixing white of egg with freshly burnt lime in a state of powder. Lutes to resist the action of intense heat are made by mixing clay and sand with hair and iron filings. A lute to resist the action of water is prepared by melting three parts of pitch and one part of wax, and mixing with them four parts of brick dust. It is applied by saturating pieces of canvas or linen with it whilst hot, and applying them in this condition to the joints of any apparatus to be secured. There are many other kinds of lutes to be found described in works on practical chemistry.

THE FORMATION OF ORGANIC COMPOUNDS.

No. IV.

BY DR. CHARLES LÖWIG.

At present, no satisfactory explanation has been given on the influence which the ferment exercises on fermentible bodies during their fermentation. Liebig perceives the cause by which the phenomena of fermentation are called forth, in the capacity which a body possesses in a state of decomposition to induce an equal activity by contact in another substance, that is, to produce a like change in it. From the fact that yeast is an organized being, others venture to believe that its vital activity calls forth the primary affinities of fermentible bodies, and thereby induces their decomposition; and also that the germs of these fungi are contained in the atmosphere, because when the air which is necessary to the introduction of putrefaction is conducted through a heated tube, destruction of these germs ensues, and consequently putrefaction does not take place.

As in the phenomena of fermentation no chemical influence of the ferment is perceived, since the fermentation process only goes on by the direct contact of the saccharine solution with the yeast; and as in the action of emulsine on amygdaline, and diastase on starch, no previous decomposition of the ferment could have taken place; Berzelius and Mitscherlich compare the influence of ferments to the action of platina on a mixture of hydrogen and oxygen gases. According to Berzelius, the ferment has a catalytic action on the elements of sugar, and thereby induces its decomposition into alcohol and carbonic acid. According to Mitscherlich, the surfaces of certain bodies have the power to effect in others decomposition and combination. He calls

these bodies contact substances. Still all these explanations are unsatisfactory. Because the putrefaction of nitrogenous bodies does not take place at 32° Fahr. and under, it is assumed that a slight heat is sufficient to arouse the original affinities of the oxygen for the elements of the radicals, and thereby to induce decomposition.

The primitive cause of the phenomena of fermentation is, that the elements of fermentible and putrefactive substances are only combined with one another by weak affinities, and not conformably to their primary affinities. Unimportant causes are sufficient to call these forth. Ferments therefore operate as heat; but our knowledge of the method of action of ferments is quite as little as that which we possess respecting the action of heat. All fermentation or putrefaction is attended with the evolution of heat. In fermentation, when the mass is considerable, the thermometer rises from 9° to 14° Fahr. The heat which becomes free is important with reference to the capacity of water for heat, besides a portion which is rendered latent by the formation of carbonic acid. This heat is developed by the action of the oxygen of the sugar on the organic radical, and as the oxygen combines with a part of the carbon atoms to form carbonic acid, so must always as much heat become free as by direct combustion. When through the decomposition of organic compounds no formation of inorganic bodies takes place, but they are broken up only into organic compounds of a lower order, then either no or a very slight evolution of heat is perceived.

Fermentation and putrefaction with the co-operation of the oxygen of the atmosphere, agree in their ultimate results with the combustion of organic bodies. Substances in a state of putrefaction absorb by degrees as much oxygen as is necessary for the complete oxidation of their carbon and hydrogen atoms; only the process of oxidation succeeds more slowly than by proper combustion; and before this process is ended, a series of new compounds are formed, many of which are distinguished by their great constancy and their power, in a certain degree, to resist the action of oxygen. The finer the putrefying body is divided, the higher the temperature and the less hindrance it is able to offer to the influence of the atmosphere, the more rapidly its decomposition proceeds. This decomposition, which has been called decay, mouldering, or slow combustion, is always attended with the evolution of heat, but seldom with that of light. Sometimes the heat rises by degrees to the point at which quick combustion ensues. Decaying nitrogenous compounds form, at the beginning of their putrefaction, ammonia; however, by complete oxidation, their nitrogen is evolved in a free condition. When strong bases are present at the same time, the nitrogen is oxidized through its predisposing affinity, and forms nitric acid. Non-nitrogenous compounds, in a state of decay, appear, under certain conditions, to absorb nitrogen from the atmosphere under the formation of ammonia, or by the presence of strong bases under the formation of nitrous or nitric acid.

Many organic substances undergo no change in the atmosphere, in their pure condition; but when ferments, aided by the action of the air are present, their partial oxidation often ensues. Alcohol, mixed with

yeast, and exposed to the action of oxygen, is converted, under the partial oxidation of its hydrogen, into aldehyde, which then, by further oxidation, becomes acetic acid, thus:—$C_4 H_6 O_2$ first becomes $C_4 H_4 O_2$, and then $C_4 H_4 O_4$. Finely divided platina also acts in the same manner as yeast.

The more highly organized animals do not possess the capacity, like plants, to prepare from inorganic materials, as carbonic acid, water, and ammonia, the compounds necessary to their existence. All matters which they require for nourishment, must be presented in an organized form, as they are present in plants. These substances belong particularly to the class of protein compounds, which must be considered as proper food. They agree, in their essential properties, with the chief constituents of the animal body, and are distinguished from the latter, only by containing less oxygen. But in proportion as the animal takes in fresh nutriment, that which it had previously received and already employed for sustenance is again separated; and because all portions which are now removed differ in every relation to the substances which were received as food, and are no longer fitted for nourishment, it will be understood that, in the animal body, a continual decomposition must take place of the substances received as food.

As is well known, all nourishment is supplied by the blood; therefore, food must, when it serves for nutrition, first pass into the blood, or rather become blood. This transaction proceeds gradually by digestion, which begins the moment when the food, mixed with the saliva, has reached the stomach, and terminates when all the blood-like materials have reached the heart, through the returning stream of venous blood. In order that these materials may become an effective means of nutrition, they must yet receive oxygen, a process which takes place in the lungs.

From the blood, the compensation now is distributed, for the parts wasted by the act of living, and at the same time, these wasted parts are received by the blood, and are rapidly separated from it, through various organs. Hence it results, that there are always two processes going on in the animal organismus simultaneously. One is the process of assimilation, which may be compared to the conversion of starch into sugar, by the influence of diastase, The other is the process of decomposition or separation, and resembles putrefaction or fermentation. The whole may be considered a change of matter; and in the correct proportion of both, lies the normal condition of the vital activity.

As in putrefaction, the higher compounds, having served for nutrition, are decomposed in consequence of the reaction of the combined oxygen on their carbon and hydrogen atoms, into carbonic acid, water, and lower organic compounds, as urea and uric acid. This process of decomposition must be attended with an evolution of heat, as in fermentation, and herein exists the source of constant animal heat. As this decomposition progresses uninterruptedly and contemporaneously in all parts of the animal body, so the evolution of heat must proceed contemporaneously in all parts of the animal organismus. Great abnormal chemical activity in individual parts, must necessarily be attended with a great evolution of heat in the same. This is not the result of the direct influence of the oxygen, taken up by the process of

respiration, on the organic materials. From what has been stated, it appears that permanent organic compounds, especially when they are rich in nitrogen, cannot be materials for nutrition,

Chemically acting matters, as oxygen, the salifiers, strong acids, and bases, combine either directly with organic bodies, or they produce a decomposition of these bodies through their chemical affinities, by ordinary or little elevated temperatures. This arises frequently because the atoms of organic compounds are transposed in such a way that basic or acid compounds are formed which combine with the influencing matters, or because these latter combine with the principal or separated constituents of the organic substance. Many organic compounds which consist of carbon and hydrogen, and also many which are poor in oxygen, are distinguished by their permanancy; whilst others, particularly compounds of a higher order, are decomposed by the action of inorganic reagents either into their principal constituents, with one of which the reagent employed combines; or they suffer by strong acids or bases such a transposition in their composition that chemically opposite compounds become formed, which combine with the reacting acid or base. However, it is often doubtful, with reference to the facility with which many organic compounds are decomposed, whether the products which are thus obtained are really the principal constituents of the organic compounds, or whether the decomposition of its radical has not taken place.

Indeed, according to the original affinities of the reacting body for the individual atoms of organic compounds, the products of the decomposition of like substances must be various. By the action of oxygen, its great affinity to their carbon and hydrogen comes into operation.

When the individual carbon or hydrogen atoms of the hydro-carbon radicals, or both together, are thus withdrawn, new radicals result, some rich in carbon and others rich in hydrogen, which either remain in combination with the bodies which were combined with the original radical, or become oxidized together, at the cost of another portion of oxygen. By these reactions the phenomena of decay are to be explained. The salifiers act in many cases very similar to oxygen; they decompose organic radicals under the formation of hydrogen acids, and radicals poor in hydrogen, which mostly enter into combination with the salifiers. Thus the oxide of ethyl, $C_4 H_5 O$, when brought into contact with chlorine, is first converted into the oxide of acetyl, $C_4 H_3 O$, by the abstraction of H_2; the oxide of acetyl will then take up Cl_2 and so the oxichloride of acetyl, $C_4 H_3 O Cl_2$, is obtained.

Oxidizing compounds, as nitric, chromic, and permanganic acids, the superoxides, oxides of silver and mercury, and even many metallic salts, produce only in a few cases a complete oxidation of the entire compound. They cause mostly only a partial decomposition, under the formation of carbonic acid, water, and new radicals, which often combine with the oxidizing agent. The more easily the oxidizing body gives off oxygen, the quicker and the more complete is the oxidation of the organic compound. The products which are formed are further dependent upon the degree of concentration in which the oxidizing substance acts, and also upon the solubility of the organic compound.

When organic oxides come in contact with deoxidizing bodies, as hydrogen, sulphuretted hydrogen, potassium, zinc, &c., they are oftentimes partially or entirely reduced, without their radicals undergoing any change. When potassium is allowed to act on a hydrate, its water is decomposed, and a combination of the oxide with potash is obtained. Thus anhydrous alcohol gives, when in contact with potassium, oxide of ethyl and potash $(C_4 H_5) O, H O + H = H O (C_4 H_5) O + H$. With nitrogenous bodies potassium often occasions the formation of cyanogen.

Organic chlorine compounds are frequently decomposed in a similar way, with the formation of hydrochloric acid, chloride of potassium. &c. In most cases the same reactions are generally observed with resembling inorganic compounds. When by the influence of chemically acting bodies on organic substances new compounds with remarkable acid or basic properties result, the change, as a rule, proceeds more rapidly, from the presence of bodies which become formed and which possess opposite chemical properties. Thus alcohol, heated with water, undergoes no change, but when at the same time potash is present, acetate of potash is formed with the evolution of hydrogen gas.

Some decompositions through chemically reacting bodies are different to those named, in consequence of derived radicals being formed, by substitution, from the primary ones.

ON THE USE AND PREPARATION OF COLLODION FOR PHOTOGRAPHY.

BY BINGHAM.

Although by means of albumen a very fine picture can be obtained, yet this method has the disadvantage that to procure a picture the plate must remain so long a time in the camera obscura as to render it unsuitable for portraits, but nevertheless valuable to architects and surveyors.

I will now communicate the details of a method by which pictures can be obtained, by means of collodion, on glass, and which is not inferior to the albumen process, and excels even the daguerreotype in its sensibility to the action of light.

In a *brochure* published in 1850, in London, I proposed the application of collodion in photography. The method is very simple, and consists in the substitution of a film of collodion for the albumen suggested by Niepce. Every operator who has been accustomed to use albumen on glass will readily succeed with collodion. To obtain a picture, two or three different methods can be followed, which I will mention. I divide the process into four different operations :—

1. The preparation of the collodion.
2. The application of the collodion to the plate.
3. The elimination of the picture.
4. The fixing.

Preparation of the Collodion.—The collodion is prepared by dissolving gun cotton in ether. It is necessary that the gun cotton and ether should be quite pure, that is, that they should not contain a trace of sulphuric

or nitric acids. Collodion is more or less fluid, according to the proportions employed of the gun cotton and ether. It must be so fluid, that when poured on a glass plate it will flow and spread readily over the entire surface of it; when it is too thick, ether must be added. If the collodion be too thick, it is difficult to obtain an even surface with it; and if too fluid, its sensibility is very weak. The collodion is to be poured into a glass bottle of six-ounce capacity, which contains already 53 grains of iodide of ammonium, and 2 grains of fluoride of potassium with 4 or 5 drops of distilled water. The iodide of ammonium must not be completely dissolved in the water, therefore the quantity must not be sufficient to dissolve it; it is enough that the salt be nearly dissolved. Its complete solution results upon the addition of the collodion.

The following statement explains how important it is that these details should be observed:—When too much water has been added, the film of collodion will not adhere well to the plate, and becomes separated in the nitrate of silver bath. The bottle must be once or twice shaken, and the fluid allowed then to clear itself by subsidence. Its colour will be pale yellow; but when the ether of the collodion contains a trace of acid, the decomposition of the iodide of ammonium takes place, iodine is set free, and the fluid acquires a dark brown colour.

This method is the shortest, although it presents somewhat more difficulty than that for the iodized collodion, which I will now communicate.

Into a six-ounce bottle, 12 grains of iodide of potassium, and from 7 to 8 grains of iodide of silver, are to be introduced; a few drops of water are then to be added, but not more than sufficient to dissolve the iodide of potassium. The bottle is then to be filled with collodion which possesses the right degree of fluidity. The mixture is now shaken two or three times, and then set aside for two or three days until it has become transparent. It should be quite white, but generally it is somewhat yellowish.

Preparation of the Plate.—The glass plate should be fastened to a piece of gutta percha. This substance easily adheres to the glass when warmed. By means of cotton, a few drops of ammonia, and tripoli, the glass should be rubbed in small circles, as by the daguerreotype plates. The remaining tripoli is to be removed from the plate by means of a pad of cotton, which is again to be rubbed in the manner above described, with a mixture of alcohol and tripoli. There sometimes yet remain some fragments of cotton and tripoli, which must be removed by pouring on the plate pure alcohol, rubbing it with a thick pad, with great care, and finally with a fresh dry pad. It may be known when it is fit for use by moisture condensing regularly over its entire surface when breathed upon. While the plate is yet held by the gutta percha the collodion is slowly poured over it, and it should be inclined from one side to the other, so that the fluid may spread itself evenly on the corners. The excess of liquid should be poured back into the bottle from one of the corners of the plate.

The plate appears then to be covered with thin strips, which are all

perpendicular to the direction of the current of the fluid. When the plate is inclined in another direction, the strips are dissolved and the film becomes thin and uniform. Before the collodion dries, the plate is to be placed, with its covered surface downwards, in a bath of nitrate of silver.

This bath must contain 40 grains of nitrate of silver to an ounce of water. The surface of the plate does not become immediately moistened, as it requires a certain time for the ether to mix itself with the water. At least, the plate is allowed to remain in the bath half a minute, without coming in contact with the bottom. It must be suspended therein by means of a noose of silver or platina wire. So soon as it is perceived that the plate is covered with an uniform white film, and the water flows readily over its surface, it must be removed and brought directly into the chamber of the camera obscura. It must not be kept longer than ten or fifteen minutes; in fact, the sooner it is used the better.

Elimination of the Picture.—The plate is placed on a support, and on its surface a solution, consisting of 2 parts of pyro-gallic acid, 60 parts of glacial acetic acid, and 500 parts of water, quickly poured. When it has not been sufficiently exposed in the camera obscura, a few drops of a solution of nitrate of silver may be added; but generally this addition is not necessary.

As soon as the picture is well developed, which requires about two minutes, the plate should be washed in a stream of water, and then fixed by pouring over the picture a saturated solution of hyposulphite of soda. The film of iodide of silver disappears, and the picture is developed, which is sometimes positive. It is then to be washed with plenty of water to remove completely the hyposulphite of soda. The plate is then dried over a lamp or in the air. Before the drying, the film of collodion is very soft, but afterwards it becomes hard and adheres to the glass as albumen.

By this method it is very easy, when desired, to obtain directly at the beginning a positive picture of great beauty, which will be more powerful and purer than those of the daguerreotype, and free from that disagreeable reflection of light which these latter are subject to, whereby they can be seen to advantage only in certain positions.

To insure this result the action of the camera must be shorter, as with negative pictures; and when the picture shall be positive, it must be allowed to remain in a mixture of pyro-gallic acid, with one or two drops of the solution of nitrate of silver.

When the positive picture is well developed, it is fixed by the same means as the negative ones. The time which is generally necessary to obtain in the shade, with an ordinary German object glass, a good negative picture, is about three or four seconds, which is less than half of the time which is required to produce the same result by the daguerreotype.——*Comptes rendus.*

FACTS AND DISCOVERIES IN SCIENCE.

Remarkable property of Sulphate of Quinine in solution.—Professor Stokes, Professor of Mathematics in the University of Cambridge, in

describing and explaining some of his recent discoveries in optical science, adverts to the peculiar action upon light exhibited by a solution of sulphate of quinine when placed in certain positions. This property of a solution of sulphate of quinine had not escaped the notice of Sir John Herschel, who considered the change in colour produced in the solution as existing only upon the surface. Sir David Brewster, however, shewed that it was not confined to the surface, but that it penetrated to a considerable depth into the body of the solution.

The simplest way for viewing this curious effect is to take a glass, containing an acidulated solution of sulphate of quinine, and place it on a black ground, in such a position that the ray of light should only impinge itself on one side, the other side being free from the direct action of light. If the experimenter then look in a horizontal direction, through the solution towards the light, he perceives nothing more than a slight opalescence; but if he alter his position, and look in a vertical direction through the solution towards the light, he then would perceive a vividly blue colour, spreading itself along the surface, and also reaching to some depth below it. This colour is supposed to result from the action of the strata which the light first penetrates on entering the liquid; and the dispersion of light producing it was termed by Sir John Herschel, "*epipolic dispersion*," from the circumstance, as he supposed, that it takes place upon or near the surface by which the light enters. In experimenting and reasoning upon the possible nature of the "epipolized light," Professor Stokes was led to the conclusion that it could only be light deprived of certain invisible rays, which, in the process of dispersion, had changed their refrangibility, and had, in consequence, become visible. This conclusion, he has been enabled to confirm by a series of the most decisive and satisfactory experiments, proving that the blue colour in the solution is produced by certain chemical rays of the spectrum, more refrangible than the violet, and which, under ordinary circumstances, are quite invisible. He explains the distinction between "false internal dispersion," or "opalescence," in which the luminous rays are merely reflected from fine particles held in mechanical suspension in the liquid, and the cases of "true internal dispersion," as in the solution of sulphate of quinine, which he terms "fluorescence." By suitable methods of observation, the change of refrangibility has been detected as produced not only by transparent fluids and solids, but also by opaque substances; and the class of media exhibiting "fluorescence" was found to be very large, consisting chiefly of organic substances, but including, though more rarely, some mineral bodies. The direct application of this fact to many interesting and important purposes is easily to be perceived. The constancy with which a peculiar mode of changing the refrangibility of light is proper or belongs to a particular substance, exhibiting itself independently of its admixture with other substances, furnishes us at once with a new method of analysis for organic compounds, which may prove a most valuable addition to organic chemistry.

Delicate Test for the Presence of Soda.—At the meeting of the British Association for the Advancement of Science, lately held at Belfast, Dr. Andrews read a paper on the application of polarized light to the

discovery of minute quantities of soda, in which he stated that the double salt of sodium and platinum was remarkable to an extraordinary degree for its depolarizing power; and that the most minute trace of this salt, so minute as to be quite invisible to the naked eye, could be very readily detected by the brilliant display of prismatic colours when acted upon by polarized light. The extreme delicacy of this test is such, that the presence of this alkali can be detected when in a quantity so very minute as the one-millionth part of a grain. Dr. Andrews asserts that the double chloride of potassium and platinum shows no depolarizing action when placed in the dark field of the polariscope.

Preparations of Iron.—M. Martens, in an important essay, which he read at the Academy of Medicine of Belgium, gives the following as some of the conclusions he arrives at as the result of his experiments and observations on ferruginous preparations:—

1. As a general rule, the lactate of iron is the best preparation; this conclusion he deduces from the chemical fact of the conversion of the other preparations of iron into lactates in the stomach.

2. It may be advantageously replaced by the carbonate, given in water, or in pills made with honey, so that superoxidation may be prevented.

3. All pills containing ferruginous preparations, in which the metal is liable to superoxidation, should be rejected, because they soon become so indurated that they are not easily soluble, either in water or in the natural fluids of the stomach.

4. The ferruginous preparations which are not easily soluble should always be administered to patients at meal time, so that they may become dissolved in the acid fluids then existing in the stomach.

5. Those preparations should be selected which cannot be precipitated, and so rendered insoluble by the alkaline fluids of the duodenum, especially during what is termed intestinal digestion. He affirms that bread made of wheat flour may be rendered far more than ordinarily restorative by adding a little sulphate of iron before it undergoes fermentation, and that it is only thus that an article of food entirely capable of replacing meat can be furnished.

Citrate of Iron and Magnesia.—This elegant preparation is made by dissolving the fresh precipitated hydrated oxide of iron in a solution of citric acid, and subsequently saturating the liquid with carbonate of magnesia, which is then to be evaporated. It has by no means a disagreeable taste, is easily soluble in water, and is in the form of bright brownish scales or plates; it has an advantage over the ferro-citrate of ammonia in not being so deliquescent, even if at all so; therefore it may be prescribed in the form of pills or powders, as well as in solution. The dose is from three to six grains, and it does not, like some other preparations of iron, produce costiveness. A syrup prepared according to this formula is recommended as being one of the most agreeable of all the known preparations of iron. Eight parts of the citrate of iron and magnesia are to be dissolved in sixteen parts of orange-flower water, to which 180 parts of simple syrup are to be added.

Mialhe's Syrup of Tartrate of Potass and Iron.—Sixteen parts of the tartrate of potass and iron are dissolved in as much distilled water of

any kind, and when filtered added to five hundred parts of simple syrup. This syrup is so lightly charged with iron that it is not in the least disagreeable to the taste, and is most readily taken, even by children.

Mialhe's Lozenges of Tartrate of Potass and Iron.—Fifty parts of the tartrate of potass and iron are to be added to one thousand parts of sugar, thirty parts of vanilla sugar, and ten parts of powdered tragacanth, and the whole to be made into a smooth paste with one hundred parts of water, and dried, and afterwards divided so as to form one thousand lozenges.

Sulphuret of Sodium as a Depilatory.—M. Boudet gives the following formula as a depilatory :—Sulphuret of sodium, or crystallized hydrosulphate of soda, three parts; fresh lime, in powder, ten parts; starch, eighteen parts. This composition, when moistened with a little water, becomes a very powerful depilatory, and will remove hair from the skin after a few minutes' application. It may be applied to the most delicate and irregular surfaces, and of whatsoever extent. M. Boudet states, as the result of his investigations on this subject, that the arsenic contained in the sulphuret of this metal, which enters into the composition of so many of the depilatories advertised for sale, is not the essential ingredient of many such; but that the innocuous substance above mentioned, namely, the sulphuret of sodium, may be substituted with every advantage for this dangerous, because poisonous, article.

Preparations for the Destruction of Vermin.—In 1846, when the sale of uncombined arsenic was prohibited by the Government of France, the School of Pharmacy in Paris recommended the following formula for the destruction of animals :—

Melted fat,	1000 parts.
Fine wheat flour,	1000 ,,
Arsenic,	100 ,,
Lampblack,	10 ,,
Essential oil of aniseed,	1 ,,

A preparation containing phosphorus has been recommended by Mr. Simon, of Berlin, for the same purpose; this is as follows :—

Rye flour,	180 parts.
Melted butter,	180 ,,
Sugar,	125 ,,
Phosphorus,	8 ,,
Tepid water,	180 ,,

Another formula containing phosphorus, and even more simple than the above, is this :—

Phosphorus,	6 parts.
Fine wheat flour,	300 ,,
Boiling water,	1000 ,,

M. Duboys, who appears to have given considerable attention to this subject, gives the preference to this formula :—

Melted fat,	400 parts.
Nut oil,	200 ,,
Fine wheat flour,	400 ,,
Powdered sugar,	250 ,,
Boiling water,	400 ,,
Phosphorus,	20 ,,

He recommends the phosphorus to be placed in a stone or porcelain mortar, and to be liquefied by the boiling water; the flour is then to be quickly, yet gradually, added, the mixture being stirred with a wooden pestle. When this mixture has become almost cold, the fat, already melted and gently warm, is to be added to it; the nut oil is next to be added, and lastly the powdered sugar; and the whole composition is then to be well stirred till it becomes cold. The compound or paste should be kept in vessels, so as to be preserved from the action of the air and light. When employed for the destruction of animals, it is to be very thinly spread on slices of bread, or bread and butter, and most probably it will be eaten by them with the greatest eagerness.

Stains caused by Nitrate of Silver.—It is affirmed that stains on linen produced by the nitrate of silver may be easily and completely removed by thoroughly wetting the linen, or the part of it which is stained, with a solution of bichloride of mercury, and then causing the linen to be well washed in cold water. The strength of the solution of the bichloride of mercury is recommended to be as one part of the bichloride of mercury to thirty-one of distilled water.

CHEMICAL EXAMINATION OF THE LEAVES OF UVA URSI.

BY A. KAWALIER.

The watery decoction of the leaves of *Uva ursi* gives, with sugar of lead, a precipitate, which is almost pure gallate of lead. The fluid filtered from the lead precipitate was evaporated in a retort until it had the consistence of syrup, and again filtered, to remove some lead salt which had separated. The filtrate was treated with sulphuretted hydrogen to remove all the lead, and then, by a gentle heat, further evaporated. After a couple of days a body separated, which, under the name of arbutin, has been long known in acicular crystals. By repeated crystallization it was purified, when it was obtained in long, thin, colourless, bitter-tasting prisms, soluble in alcohol, ether, and water, melting when heated, and afterwards, when cooled, becoming an amorphous mass. When dried in the air, these crystals gave, by analysis, as their constitution, $C_{32}H_{24}O_{21}$. When dried at 212° Fahr., whereby their external appearance was not changed, they have the composition $C_{32}H_{22}O_{19}$. Dissolved with emulsine in water, they are decomposed. When the solution is evaporated, and the residue treated with ether, a substance, arctuvin, dissolves out in the ether, which separates from it when evaporated in crystals. The residue which remains after treatment with ether contains grape sugar, which, by extraction with alcohol, separates from the emulsine, and can, by crystallization from water, be purified. The arctuvin possesses the composition $C_{20}H_{10}O_7$; therefore air-dried arbutin, $C_{32}H_{24}O_{21}$ = arctuvin, $C_{20}H_{10}O_7$ + grape sugar, $C_{12}H_{14}O_{14}$ and arbutin dried at 212° = arctuvin, $C_{20}H_{10}O_7$ + $C_{12}H_{12}O_{12}$.

The arctuvin can be obtained by re-crystallization from alcohol and water, and treatment with animal charcoal in four-sided, colourless, bitter-sweet needles, from four to six lines long, and from two to three

lines broad. From a watery solution, not entirely decolorized, brown crystals may be obtained by slow evaporation, an inch long and half an inch broad. From its constitution it may be considered a product of the oxidation of a body which has the same composition as camphor; thus, two equivalents of camphor ($C_{20}\,H_{16}\,O_2$) + O_5 — H_6 = $C_{20}\,H_{10}\,O_7$.

A solution of the crystals in water gives, on the addition of a solution of chloride of iron, an indigo blue colour, which in less than a second changes into a green, and then yellowish-brown colour. If we consider this reaction as belonging to the salicyl group of compounds, we may regard arctuvin as the hydro-salicyluret of the oxide of ethyl, combined with the elements of oxalic acid; thus,

$$C_{20}\,H_{10}\,O_7 = C_2\,O_3 + C_4\,H_5\,O + C_{14}H_5\,O_3.$$

Arbutin becomes, in contact with the vapour of ammonia and the atmosphere, of a slight blue colour. Arctuvin, under the same circumstances, becomes black. The compound which is thus formed consists of $C_{20}\,H_{10}\,H_3\,O_{20}$.

Arctuvin is readily changed by oxidizing agents; and by a cold solution of bichromate of potash, it becomes coloured brown.

Besides gallic acid and arbutin, fat, wax, and chlorophyle are contained in the leaves of *Uva ursi*, as well as a little sugar, a trace of ethereal oil, and a small quantity of a body which, with diluted sulphuric or muriatic acid, produces an ethereal oil which absorbs oxygen quickly from the air, and becomes thereby of a dark colour. Such an oxidized oil was found to be represented by the formula, $C_{20}\,H_{16}\,O_5$. Besides this body, there is also a resinous substance which is contained in the watery extract of the leaves, and which is separated therefrom by warming it with muriatic or sulphuric acid, and may be purified by solution in alcohol and by precipitation from its alcoholic solution with water. Its composition is expressed by the formula, $C_{30}\,H_{34}\,O_{30}$ + H O.—— *Liebig's Annalen.*

GALLIC ACID.

This acid is generally prepared by mixing finely powdered galls with as much water as is necessary to form a thin paste, in a wide porcelain or glass vessel. The mixture is allowed to stand exposed to the atmosphere at a temperature of about 80° Fahr., frequently stirred, and the water replaced which it loses by evaporation, until the fluid portion no longer gives a precipitate with a solution of gelatine. Should, however, the mixture, after being kept some months, still contain a trace of tannin, it is not of much consequence, as it will remain behind in the mother liquor when the gallic acid is separated by crystallization. The paste is now diluted with at least its own volume of water, and boiled for half an hour. The solution is filtered through linen, and the residue washed with boiling water. The resulting filtrate is evaporated, until it acquires a syrup consistence, which is the case when it is reduced to about a quarter of the weight of the galls employed, and then mixed with finely-powdered wood charcoal, and carefully further evaporated to dryness. When the dry mass has been powdered, it is

twice digested in a sand-bath, with four times its bulk of rectified spirit, and the alcoholic solution separated by filtration, after being mixed with water, is distilled to recover the spirit. The crystalline mass which remains in the retort is removed into an evaporating dish, and as much water added to it as, by the aid of heat, will cause its solution, which is quickly filtered and placed in the cold. After some days, the crystalline mass which forms is pressed, to separate the mother liquor, which is further evaporated to obtain the acid contained in it. The gallic acid thus obtained may be purified by solution in boiling water, and subsequent crystallization. The product is rather more than one-third of the galls employed.

Gallic acid pre-exists in many plants which also contain tannin. In the above process, the tannin of the galls which is present in them, to an extent mostly of 50 per cent., is converted, by a species of fermentation caused by the action of the atmosphere, into gallic acid, attended with the absorption of oxygen and expulsion of carbonic acid. When galls or tannin are boiled for some time with diluted muriatic or sulphuric acid, or with even diluted alkaline solutions, the tannin, under the influence of the air, is changed into gallic and acetic acids. Tannoxylic acid is formed when a saturated solution of tannin is mixed with a concentrated solution of caustic potash, while carbonic acid is evolved; but when the solution of tannoxylic acid is boiled, it is converted into gallic acid.

Gallic acid crystallizes in adhering masses of long needles, which possess a sour taste, and are soluble in one hundred parts of cold, and three parts of boiling water. This acid is very soluble in alcohol, but difficultly soluble in ether. By a temperature between 410° and 419°, it breaks up into pyrogallic acid and carbonic acid. Its watery solution, under the influence of the atmosphere, rapidly decomposes with the formation of mould. In concentrated sulphuric, it dissolves with a purple colour. When the solution is heated to 284°, red crystals of rufingallic acid, $C_{14}\ H_4\ O_8$, are separated.

Although gallic acid is a very weak acid, it combines with all bases, and forms with them partly crystallizable salts. Its alkaline salts, with an excess of base, in the presence of the atmosphere become darkly coloured, absorb oxygen, and are converted into tanno-melanates. The constitution of gallic acid is expressed by the formula, $C_{14}\ H_4\ O_8 + 2\ H\ O$. Its most frequent adulteration is tannin, which may be readily detected, as previously stated, by a solution of gelatine.

ACTION OF CHLORIDE OF ZINC ON CELLULOSE.

It is already known that chloride of zinc produces a change in woody fibre. Barreswill has observed that Swedish paper is by its action first converted into sugar, which is afterwards destroyed by its agency. Soon after contact with chloride of zinc, the paper becomes blue when tested with iodine. When the paper is soaked in a solution of caustic soda, or potash, it gives the same reactions as when treated with chloride of zinc.

THE COUNCIL OF THE PHARMACEUTICAL SOCIETY.

Well might Dr. Crisp tell the chairman of the Select Committee on the Pharmacy Bill, that "he was afraid the Pharmaceutical Society would become a kind of club, in which certain men would assume the power of lording it over others." Had the Doctor been as well acquainted with the machinery of this Society as we are, he would have stated that it was at present such a club, ruled over by a very few microscopic Napoleons, who, like one of the French kings, when asked what constituted the state, answered, "I am the state." These infusorial magnates consider themselves the Pharmaceutical Society, their interests the Society's, and even its property theirs. Woe betide the unlucky wight who has the hardihood to express contrary opinions. They will denounce him as a red republican,—as a person utterly unfit to come "between the wind and their nobility."

Long as they have legislated, ostensibly for the good of the members,—and well practised as they are in that genteel art of persuading the world that they are labouring zealously for the interests of others, and sacrificing their own,—yet they find, with all their experience and accomplishments in this species of deceit, that there are some—very wicked persons, of course—who do not put their trust in them. Ill requited men must they be to have such unbelievers, and receive such ingratitude after all their attempts at propitiating these turbulent spirits. Willing as these magnates have been to avert opposition at any price, but the price of doing that which is just, they must not be surprised to find, despite their blandishments, that distrust and reprobation will overtake them, and that there is but one thing that will permanently exalt men in public estimation, and render all opposition nugatory,—namely, honesty of purpose.

We have been led to these remarks by a concession, however small, that the Council of this Society has been obliged to make to public opinion and truth, notwithstanding all their protestations against the policy and necessity of any such concessions.

Our readers will remember that we have argued against the continuance of the School of Pharmacy, against the absurdity of the student relying on lectures on materia medica and pharmaceutical chemistry, as it is misnamed, for a knowledge of those sciences which the pharmaceutist requires for the skilful practice of his profession; and against the iniquity of allowing pluralities and their concomitant abuses to exist in a public institution. Had there not been more truth in our arguments than we have feebly expressed, our words would have borne no fruit; and it is well known that the directors of public institutions are so obtuse to public opinion, where their interests are concerned, by reason

of their divided responsibility, that they never yield to it alone; therefore, it is evident that the Council must have felt that both truth and public opinion were in favour of the views we have advocated, or they would not have abolished the professorship of materia medica, and removed Mr. Redwood from the arduous labours of one of his pluralities, by appointing the person who actually did the work, although the pluralist is still to retain the honour of the office without the emolument, by a strange obliquity of purpose.

More than this, the interests of the members are to be considered with regard to the delivery of the lectures, some of which are to be given at such times as may be deemed most convenient for them to attend. We have little doubt that shortly we shall hear that it is determined by the Council that the most interesting of the lectures shall be published in the Transactions of the Society, for the benefit of those who cannot be present at their delivery.

We cannot thank the Council for any of these reforms, because they have not even yielded gracefully to the march of events; but only after much external pressure, instead of taking the initiative in these needful measures. We caution them, if they wish to avoid odium in future, and to escape bringing the Society into contempt and disrepute, to legislate as if they were amenable to public opinion for all their proceedings, and as if the eyes of the members were actually watching their conduct when assembled in their chamber. They must not forget that the time will arrive when the election of the Council will be no longer a farce, in consequence of the country members exercising the power of voting, which they now possess under the Pharmacy Bill; and then the Council will cease to be a self-elected one, as it is virtually at present. We augur that much benefit will arise to the Society from this new feature in the method of electing its officers, as the will and the interests of the members at large have heretofore never been represented in the Council, which is not a surprising result, considering that it has consisted for many years of two or three popularity-hunting individuals and their nominees or *protégés*.

CHEMICAL AND PHARMACEUTICAL JOURNALISM.

The recent death of the only weekly British journal of chemical and pharmaceutical science, brings the humiliating fact prominently before our eyes, that such is the lack of both writers and readers in these departments of useful knowledge, that, in an empire supposed to be the most civilized in the world, and whose extent is so vast that the sun nevers sets upon its dominions, a weekly record of the progress of these

sciences can neither find readers to support it by their subscriptions, nor writers to fill its pages.

The establishment of the "Chemical Record," last year, was the third attempt of a similar kind, within ten years, to place within the reach of those who are interested in receiving, more quickly and frequently than any monthly journal could supply, information upon the progress of chemical and pharmaceutical research; but, alas! the attempt was still in advance of the requirements of a sufficient number of British readers, for the "Chemical Record," after fighting bravely against this insurmountable disadvantage for twelve months, was at length obliged to succumb to it.

We regret this result for many reasons. We know the necessity and benefit of a scientific journal, published at more frequent intervals than is usual in this country, for it admits of a more rapid correspondence on many subjects of an urgent nature. We shall miss the many brilliant editorial effusions of the conductor of the "Record," a writer of great and varied power, who, if he failed at all in the management of his journal, failed because such an undertaking as a weekly journal was too much for the unaided exertions of any one man. Those not conversant with scientific journalism, might suppose that the aid of contributors could be secured without difficulty, as is the case with the press in general. But we can tell the uninitiated that there is such a dearth in this country of literary scientific men, that those who venture to establish scientific journals, must rely on their own exertions and on foreign communications to fill their columns with matter that is at once interesting and novel.

Moreover, no chemical periodical can exist in England as a profitable undertaking to the conductors, which is unacquainted with the position and the wants of the pharmaceutical chemist, because the number of pure chemists is so limited, that experience has proved that a journal which merely addresses them, will scarcely pay, by its sale, the expenses of the paper on which it is printed. We cannot mention a better proof of this fact, besides the case of the "Chemical Record," and the position of other journals, into whose affairs we are forbidden to pry, than a statement just published by the proprietors of that invaluable work, "Liebig and Kopp's Annual Report of the Progress of Chemistry," that it is to be discontinued, from its sale not meeting its expenses, unless 350 persons will, for the future, guarantee the publishers from loss, by an annual subscription of one guinea each. We trust every lover of chemical science will come forward to rescue this work from extinction, as by so doing, he will confer a benefit on himself, and assist in diffusing scientific lore amongst others; for it is only by many minds working on one subject, that great results are obtained.

When we contrast the number and character of the chemical journals of France, and especially of Germany, with those of our own country, the result is one very unflattering to our pride, and detracting from our national pre-eminence. This state of things has arisen not from any natural incapacity of our countrymen, but simply from the want of encouragement by our public institutions to men whose means will not allow the sacrifice which scientific researches involve, and who cannot live by the gospel of science, if they preach it.

LIEBIG ON PRACTICAL PHARMACY, AND SCHEERER ON THE BLOWPIPE.

We have now completed in this journal a translation of a series of papers on Practical Pharmacy, which we venture to assert are unequalled for their lucid, comprehensive, and philosophical character by any other treatise, whether of British or foreign origin. We made no great pretension of their excellence when we introduced them to the English reader, because we knew their sterling merit would speak for itself. Our readers must not suppose that we have given all the matter which Liebig has written on this subject, because a considerable portion of his treatise, however valuable and interesting to German pharmaceutists, is barren of instruction, or superfluous, to the English chemist, by reason of the different circumstances by which they are surrounded; hence we have not hesitated to use the pruning knife where we deemed it necessary.

In pursuance of the plan on which this journal was established, and which has met with the approbation of our subscribers,—namely, to give a course of practical instruction for educational purposes,—we shall introduce, next month, the first of a series of papers on "The Use of the Blowpipe for Chemical Analysis," a subject little understood in England, and less cultivated than it deserves to be. These papers will be from the pen of Dr. Theodore Scheerer, Professor of Chemistry to the Royal Saxon Mining Academy, at Freiberg, and will be illustrated with well-executed woodcuts. When we state that these papers have already appeared as a Treatise on the Blowpipe, in that gigantic, although yet incomplete, masterpiece of chemical literature, "Liebig, Poggendorf, Wöhler, and Kolbe's Dictionary of Pure and Applied Chemistry," and have since been published in a separate form on account of their value, we present to our readers a sufficient guarantee of their intrinsic worth.

QUANTITATIVE DETERMINATION OF OZONE.

BY C. F. SCHÖNBEIN.

As ozone combines in the cold with silver to form superoxide of that metal, while ordinary oxygen behaves indifferently to it, I have formerly determined the quantity of ozone in a given volume of air, by the weight of the superoxide of silver which is produced by its action on metallic silver. When, for example, 60 litres of artificially ozonized air have given 100 milligrammes of superoxide, so I have considered that the air contained 13 milligrammes of ozone, upon the assumption that this body is nothing but allotropic oxygen. In consequence of the tardiness of this method I have devised a more convenient one, which depends on the property which ozone possesses, of destroying with chlorine-like energy the sulphate of indigo, and which property is not possessed by oxygen. For this purpose I employed a solution so diluted with water, that 10 grammes are destroyed by one milligramme of oxygen, which I prepared in the following way:—100 grammes of indigo solution, prepared according to the method of Berzelius, are mixed with an equal quantity of muriatic acid, and heated nearly to the boiling point. To the hot fluid I add, in small portions, with agitation, a solution of chlorate of potash, containing one per cent. of that salt, until the fluid becomes of a yellowish brown. If for the destruction of the indigo solution 100 milligrammes of chlorate of potash are required, I conclude that this effect has been produced by 39 milligrammes of oxygen contained in the salt employed; and therefore one milligramme of oxygen possessed the power of destroying $\frac{100}{39}$ grammes of the indigo solution test.

To adjust the strength of this solution, so that 10 grammes shall exactly have its blue colour destroyed by one milligramme of oxygen, I mix 100 parts of it with 290 parts of water, and keep the mixture in a closed and filled bottle for use.

To determine the quantity of ozone in a ballon containing 30 litres of air which has been ozonized by means of phosphorus, I weigh 300 grammes of the test liquid, about half of which is poured into the ballon. After the ballon has been well shaken, a small quantity of the fluid is taken out to see if it be discoloured. If this be the case, I introduce into the ballon a strip of paper moistened with a solution of iodide of potassium. Should this paper become blue, more of the test liquid is agitated with the air, and this operation is repeated until a fresh portion of the paper remains white.

When 250 grammes of the test liquid are required for this purpose, the weight of the ozone may be reckoned as $\frac{250}{10} = 25$ milligrammes. To find the proportion of ozone to the air with which it is mixed, the weight of the air must be correctly ascertained, by making the necessary calculations from its volume, with the corrections for temperature and height of barometer.

My recent researches have shown that atmospheric air can become ozonized by phosphorus to $\frac{1}{1300}$ of its weight; and when the ozone does not act energetically on the phosphorus by oxidation, a yet greater amount of ozone can be obtained. I have already mentioned the great

resemblance that exists between the action of ozone and chlorine on phosphorus, both of which combine rapidly with phosphorus at ordinary temperatures. Atmospheric air, containing $\frac{1}{500000}$ of its weight of ozone, possesses the peculiar odour of that body, which indicates what an intense odour ozone must have in a pure condition.——*Journal für Praktische Chemie.*

THE COMPOSITION OF HYDRATED OXIDES OF IRON, OF VARIOUS AGES, AND THEIR APPLICATION AS ANTIDOTES TO ARSENIC.

BY J. LEFORT.

When persalts of iron are treated with alkalies only two hydrated oxides of iron are obtained, which have compositions expressed by the formulæ:—

$$2\,Fe_2\,O_3 + 3\,H\,O \text{ and } Fe_2\,O_3 + 2\,H\,O.$$

The first is always procured when a hot solution of a persalt is precipitated with a hot solution of caustic soda or potash. I have analyzed it when dried over sulphuric acid, and found that it contains from 14.82 to 14.55 per cent. of water. By calculation, it should contain 14.44 per cent. It loses water when exposed to a temperature between 212° and 176° Fahr.

The second hydrate results, when into a cold solution of a persalt is poured a cold solution of caustic soda, potash, or ammonia. It is more flocculent and darker brown than the former, and begins to lose its water at a temperature of 167° Fahr. By two analyses, it gave 18.23 and 18.40 per cent. of water, and according to calculation, 18.36 per cent.

Many chemists have also calculated formulæ for those hydrated peroxides of iron which are obtained by precipitation, partly in the cold and partly at a boiling heat, by means of carbonated alkalies. I have repeatedly and always found that these peroxides contain from 2 to 6 per cent. of carbonic acid. The latter of the first-mentioned oxides is, as is well known, employed as an antidote to arsenic. Wittstein has observed, that when it has been prepared a certain time, even six months, and kept under water, it lost water, became crystalline, and was much less soluble in acids than the freshly prepared oxide.

I have examined hydrated oxide of iron which had been kept three years under water, and found that it contained the same quantity of water as that which had been recently prepared; under the microscope it did not exhibit the least crystalline form, and was as readily soluble in acids as the freshly prepared. Its medical properties corroborated its chemical characters, as shown by cases of poisoning, in which it was administered.

Dr. Buchner, Jun., believes that Lefort is in error, in supposing that peroxides of iron will, under any circumstances, keep unchanged in water. He finds, that when kept, although soluble in mineral acids, yet they cease to be so in acetic, tartaric, and citric acids, by which test they are distinguished from the freshly prepared. Dr. Buchner considers that the best extemporaneous method of preparing and administering

hydrated peroxide of iron, when required in cases of poisoning, is to add 16 parts of calcined magnesia to 25 parts of chloride of iron, dissolved in 75 parts of water.——*Buchner's Repertorium.*

METALLIC REDUCTION BY MEANS OF PHOSPHORUS AND SULPHUR.

BY W. WICKE.

In consequence of an observation by Wöhler, that phosphorus in combination with copper gave rise to an electric current, I have made the following investigation :—

In a somewhat concentrated solution of nitrate of silver, some sticks of phosphorus bound up with silver foil were placed. In a moment the silver and phosphorus were covered with a black film ; later, silver was deposited on the strips of silver foil in the form of warts ; and after some weeks, the foil which was removed from direct contact with the phosphorus, became covered over with a brilliant coat of crystalline silver. The form of the crystals could not be determined, because they were so interwoven with one another that all the reduced silver could be removed as a compact mass from the silver foil. The phosphorus was only on the surface slightly covered with a thin film of phosphuret of silver, and its interior remained unchanged. The silver had so impressed itself on the entire surface, that it is probable that this process may be rendered available for galvano-plastic purposes.

In a similar way, a reduction of crystallized lead from a solution of nitrate of lead took place by a combination of phosphorus and lead, while the phosphorus was covered with a thin film. In this case the reaction was weak and soon terminated.

A stick of phosphorus placed in well-pressed black oxide of copper, and covered with water in a tube filled and closed from the air, reduced the oxide to a metallic state, and in a few weeks what remained of the stick of phosphorus was covered with a capsule of metallic copper in a crystalline form, the individual crystals of which were readily distinguished by the eye.

Sulphur wrapped up in a strip of lead, and placed in a solution of nitrate of lead, effected the reduction of the lead salt in the form of a loose crystalline covering to the sulphur.

In a saturated solution of sulphate of copper, a stick of sulphur, covered with copper wire, became enveloped, where it was in contact with the copper, with a loose crystalline covering of an indigo coloured sulphuret of copper, and the copper wire had disappeared. A solution of nitrate of copper acted more rapidly. By the use of diluted sulphuric acid, no reaction took place.——*Annalen der Chemie.*

ON THE PASSIVE CONDITION OF METEORIC IRON.

BY H. WÖHLER.

I have observed in most kinds of meteoric iron the remarkable property that it exists in the so called passive condition, by which it is

incapable of reducing a solution of sulphate of copper to a metallic state; and only by contact with ordinary iron, which thereby excites an electric current in it, can it act as a reducing agent. From accordant experiments it appears that this peculiarity does not depend on the nickel present in it, nor the property to give, by etching, Widmannstatten's figures*. It is not, however, every kind of meteoric iron which possesses these properties, as there are some which give the finest figures, and are in an active condition; while others (as, for example, those from Green County, in North America), which contain 19 per cent. of nickel, give no figures, and are in a passive condition.

Of the various kinds which I have had the opportunity to examine, eight were passive, six active, and four stood between both, inasmuch as they did not reduce the copper salt at once, but only after long contact.

We might venture the opinion that probably each kind of meteoric iron upon its arrival on the earth is in a passive condition, and that this condition in the course of time, by certain local influences, passes away. As extreme examples may be adduced, the meteoric iron from Lenarto, in Hungary, which is active, or has a reducing property, and whose time of falling is unknown; and the meteoric iron from Braunau, in Bohemia, which fell on the 14th of July, 1847, and is now completely passive, and certainly not so merely at the surface, for when by contact with ordinary iron, in a solution of sulphate of copper, it becomes covered with metallic copper, and then the reduced copper filed off the new surface, it is again completely passive.

ON THE COMMERCIAL ANALYSIS OF CYANIDE OF POTASSIUM.

BY M.M. FORDAS AND GELIS.

The cyanide of potassium met with in commerce is extremely impure, containing scarcely one-half its weight of real cyanide, a circumstance much to be lamented, especially as the useful application of this substance to the arts is daily increasing, particularly since its application to photographical and electrotypical purposes.

To remedy the inconvenience arising from the impurity, M.M. Fordas and Gelis have devised a new process of analyzing this substance, founded on the action which iodine exerts on the cyanide of potassium. These two bodies rapidly combine, and each equivalent of cyanide of potassium absorbs exactly two equivalents of iodine. The nature of the products in this case is perfectly well known, and the reaction which is represented by the formula $Cy\,K + 2\,I = I\,K + I\,Cy$, has been studied by Serullas and by Woehler. The two component parts of the cyanide of potassium divide the iodine equally between them, and there is produced one equivalent of iodine of potassium, and one equivalent of iodine of cyanogen.

* When a bright surface of meteoric iron is etched with an acid, crystalline figures are developed on it, which are termed "Widmannstatten's figures."—*Editors of the "Annals."*

This reaction being understood, all that remains is to determine the conditions most likely to insure success, and the precautions required to be used in the operation. It is necessary also to guard against error arising from the action of iodine on the foreign substances contained in the cyanides of commerce, or which may be designedly added. M.M. Fordas and Gelis state that they have arrived at this result by the employment of a certain quantity of soda water, which, by the carbonic acid it contains, converts the caustic alkalies and the carbonate of potash into bi-carbonate compounds, which do not absorb iodine. The details of their process they have not furnished.

SOFT EXTRACT OF LIQUORICE P.L.

It is well known that this extract, when prepared according to the London Pharmacopœia, is apt to become mouldy, to ferment, and speedily to pass into a state which renders it unfit for use. This result is, to a certain extent, frequently avoided by evaporating the extract until it is too hard for ordinary purposes, and soluble in water only with difficulty.

The following process has been devised to remedy these evils, and produces an extract which may be retained soft without becoming in the slightest degree mouldy, or undergoing fermentation.

Take any quantity of Solazzi's juice and break it into small fragments, upon which, when placed in an appropriate vessel, pour about eight times its weight of cold distilled water; macerate, and frequently stir the mixture until the liquorice has dissolved, or at least until the soluble portion of it has dissolved. This point will have been arrived at when there are no longer any black fragments in the liquid, which then consists of a dark solution and muddy brown powder, held more or less in suspension. The liquid must now be set aside to allow this powder to fall completely to the bottom of the vessel, and when this has happened, the clear portion of the liquid should be poured off and evaporated to the consistence of a soft extract, which may be kept good and ready for use without any further treatment. In fact, the extract thus prepared answers for the purposes to which a soft extract of liquorice can be applied, and the above is an exceedingly economical process for preparing it, as it yields a weight of soft extract equivalent to the weight of Solazzi's juice employed, especially if the latter be of good quality. It is extremely well adapted for preparing compound decoction of aloes, which scarcely contains any sediment when this extract is employed in its preparation, and keeps much longer bright and good than when made in the ordinary way.

A NEW SOURCE OF PURE HYDROGEN FOR THE REDUCTION OF METALLIC OXIDES.

BY BONET Y BONFILL.

It is generally believed that a red heat is necessary for the decomposition of ammonia. I find, however, that it is easily and completely

decomposed by a more gentle heat, when passed through a porcelain tube filled with pieces of burnt lime. The lime must be entirely free from water and carbonic acid. To accomplish these objects, the lime in the tube is exposed to a red heat for half-an-hour, and afterwards, when cooled to a glowing heat, dry ammoniacal gas is conducted through it, by which means a strong stream of hydrogen and nitrogen is obtained.

When the gas is merely passed through a glowing tube, only a small quantity of the gas is decomposed into nitrogen and hydrogen, and also when the points of contact are increased in the tube by introduction of pieces of porcelain, no improved result arises.

This ready method of decomposing ammonia can be applied to the procuration of pure hydrogen, when the presence of nitrogen is not objectionable. It will serve well for the reduction of metallic oxides, as the hydrogen gas obtained in the ordinary way is constantly contaminated with a variety of foreign bodies which interfere with the process of reduction, by forming compounds with the reduced metal, and thereby prevent correct results being obtained.——*Comptes rendus.*

COMPOSITITION OF YEAST.

BY DR. R. D. THOMSON.

The yeast submitted to examination was obtained from a large baking establishment in Glasgow, and appeared to consist, when viewed by the microscope, of globules, among which were a few starch grains. Its analysis gave the following composition:—

	In 1 lb., or 5760 grains.	In 1000 parts.
Water,	5474	950.348
Organic matter,	262	45.486
Alkaline phosphates,	8.30	1.440
Phosphate of lime, Phosphate of magnesia, Carbonate of lime,	14.55	2.527
Siliceous matter,	1.15	.199
	5760.00	1000.000

PREVENTION OF INCRUSTATION IN BOILERS.

Delandre recommends for the prevention of incrustation in boilers, the application of salts of tin, especially chloride of tin, which changes when mixed with water, into an insoluble basic salt, and a soluble acid salt which dissolves the earthy salts, forming the incrustation. He employed nine pounds of chloride of tin in a boiler which, for twelve hours, daily, under a pressure of three atmospheres, evaporated 3500 pounds of water, and which, every eighth day, was emptied, refilled, and examined, by which means it was ascertained that the boiler, and the cocks and the tubes connected with it, remained perfectly free from incrustations. With large boilers which are daily employed, he reckons that two pounds of chloride of tin are sufficient for every ten cubic feet of water evaporated.

PRIZES ON CHEMICAL SUBJECTS, OFFERED BY THE DUTCH SCIENTIFIC SOCIETY AT HAARLEM.

The Society wishes that a correct chemical analysis of *Cannabis sativa* shall be performed with particular reference to the narcotic principles contained therein, which are considered the cause of the remarkable properties of the *Haschisch* of the Orientals. It asks, whether this principle is a peculiar substance (cannabine); and in this case, how is it best prepared; and what are its characteristics and properties?

The crystallization of molten or dissolved substances, depends on a great number of conditions, for example, on the presence of already formed crystals, and on the influence of the air in cases where the solution has been prepared *in vacuo*. The Society wishes that the causes which induce the commencement of crystallization, and also the passage of different bodies from a fluid to a solid condition, may be investigated and determined,

The usual prize for a sufficient answer to each of these questions is a gold medal, worth 150 Dutch gulden (£.12 10*s*.), and besides a reward of 150 gulden if the answer be considered worth it. The answers must be written in Dutch, French, English, Italian, Latin, or German (in the last case with Latin letters), and sent post free, and in the customary way, with a device and a letter containing the name of the author, to J. G. S. Van Breda, Secretary to the Society, at Haarlem, before the 1*st of January* 1853.

A METHOD TO REMOVE THE POISON FROM TOAD-STOOLS.

To remove the poison from these fungi, Gérard macerates one pound of them with two or three tablespoonfuls of wine vinegar for two hours, and then washes them well with water; after which he boils them in water from fifteen to thirty minutes, and again washes them, and prepares them for the table in the ordinary way. Gérard eat, in the presence of a commission appointed by the French Government, one pound of the poisonous fungi *Amanita muscaria*, and upwards of two ounces of the *Amanita bulbosa*, prepared in the manner described, without any evil consequences arising to his health.——*Journal de Pharm. et de Chémie.*

IMPORTATION OF LEECHES FROM AUSTRALIA.

We are informed, on good authority, that several shipments of these valuable and expensive medicinal agents have arrived in England from Australia, and therefore hope, that now steam communication has been established with that colony, there will be such an increased supply as will reduce the extravagant charge at which leeches are now supplied to the market.

EXTRACTS FROM THE EVIDENCE ON THE PHARMACY BILL, DELIVERED BEFORE THE SELECT COMMITTEE OF THE HOUSE OF COMMONS.

Mr. *Thomas Herring*, called in, and examined.

Chairman.] You have been many years a wholesale druggist?—I have been in business above forty-three years.

In Aldersgate Street?—In Aldersgate Street.

Does your business bring you in communication with the chemists and druggists throughout the kingdom?—It brings me in contact with the chemists in London and in the provinces, and in Scotland, and in Ireland; I have visited them, and know them personally.

Have you customers in most of the towns in the United Kingdom?—I should say you can scarcely mention any place that is worth going to, but what we have a connection in it.

Does that give you an opportunity of forming some idea as to the condition of the body of pharmaceutical chemists, with respect to their education, and other particulars?—Yes; I originally served my time as a chemist and druggist, at Norwich, from which place I came up to London, and started a wholesale trade; before that, I had been in general communication with chemists, and knew their character, and general mode of business.

Do you consider, from what you know of the body of chemists and druggists, that they are properly qualified for their business?—Not generally; a very great deal of mischief arises from want of knowledge; for instance, take any gentleman who is a qualified person, and knows his business, and he would not buy anything but what is of proper quality; but a great many of those who purchase drugs are men not educated, by which means a vast quantity of medicines are sold of an inferior quality.

Are there not a great many persons who assume the name of pharmaceutical chemists, who have never been educated or qualified, and who do not know their business?—A great many.

Are those persons competent to judge of the quality of the drugs which you sell?—Certainly not; and moreover, some of them when they order an article which is a poison, or a medicine of stringency, not knowing the Latin name, require the English name also.

Is that the case with a great number of persons?—That is the case.

Does that occasion the circulation in the market of a great many drugs of so inferior a quality, that they would not be received by any educated chemist?—Yes; those who do not know the quality of the drugs, are sure to be imposed upon, because the most common drugs bear the best profit.

Do you think that the ignorance of so many persons, who call themselves chemists, causes the circulation of larger quantities of inferior drugs than otherwise would take place?—I do. If a man is educated we should not show him the inferior drugs which a person who does not know the article would select in preference, on account of the low price.

Have you several different qualities of drugs?—Yes, I have; I have brought these to show the Committee (*producing some samples*). Here is a very important drug; one of the most important drugs we have; that is scammony. This article, which is imported, is of the value of 8*s.* a pound (*exhibiting a specimen*); that is not scammony, or at leaat there may be a little, but it is composed of chalk, starch, gum, and various other things; it is a made-up article. A man who does not know his business, would be quite satisfied with this article at 16*s.* a pound, which at that rate bears a greater profit than the best.

Mr. Ewart.] Where does that come from?—Smyrna, and all those parts. The article which ought to be used is called by a common expression, though not the proper one, virgin scammony, the same as virgin honey, which means first-class scammony; even this sometimes contains 10 per cent. of chalk; but it contains 80 or 90 per cent. of scammony; this article fetches at the public sale 35*s.* a pound.

Chairman.] The other sample being sold at 8*s*. ?—I can buy this at 8*s*., and it is sold at 12*s*. and 20*s*. When you meet an uneducated man, and he wants a pound of scammony at 20*s*, he would be satisfied with this article. I have been a great advocate throughout my life for forwarding the means of education to prevent this adulteration.

Mr. Ewart.] Those drugs are brought in adulterated ?—Yes, they are brought in adulterated.

The adulterated article comes from the same place as the pure ?—Yes. Jalap comes from Mexico, it ought to be the root; but when they have got as much of the root as is valuable they sometimes cut down the tree and bring it over in pieces of wood.

As to scammony, are both the adulterated and pure article imported from the same place ?—Yes.

Mr. Wyld.] Then you mean to say that it is sold in the market as an adulterated article ?—Yes; we know it must be adulterated by the price.

Mr. Ewart.] It is of course very important that the chemist should be able to distinguish between the adulterated article and the pure one ?—Not a doubt of it.

Chairman.] Does the same rule apply to a great number of other drugs besides scammony ?—Yes; I should say so, certainly.

Sir W. G. Craig.] Is it your practice to buy these adulterated drugs ?—We do not buy them largely; we are compelled to supply an article of that kind when ordered. A customer comes in, and asks for scammony at a low price; this article is produced and he buys it, but we do not keep it in stock; but a man who was educated at all would see himself that it was impure.

Chairman.] You are obliged to yield to the demand for such drugs as are asked for by your customers ?—We are forced to keep them, but we never use them in preparations.

If a person comes to you, do you ask him whether he wishes for the best or the second best article, and supply him accordingly ?—Certainly; we ask him his price.

And do you consider that it is the fact of so many persons professing to be chemists and druggists, having no education, which causes the very great demand for an inferior class of drugs ?—It is the chief, if not the entire cause of it.

Do you think if they were properly educated, the demand for those very inferior drugs would cease ?—I am certain of it; the public would be better served as to their prescriptions, and druggists would have a better opportunity of procuring good drugs.

Have you found more difficulty in satisfying your customers since the establishment of the Pharmaceutical Society; have they paid more attention to the quality of the drugs ?—Yes; it has been quite a stimulus to all those who have joined the society.

Do you find more frequent inquiries respecting the quality of the drugs to a certain extent, than you did before the society existed ?—It is in operation every day; we hear more of improvement daily in this respect.

Do you consider that that cause continues to operate in promoting superiority in the quality of the drugs which are sold ?—Yes; one is stimulating another continually now to get the best.

When one chemist has obtained superior articles, does that induce others to do the same thing ?—Yes; it is a great stimulus amongst them, no doubt; they find now that a good article is demanded, and consequently a man in his own mind will say, "I will get the best."

Then is it your opinion that the passing of a Bill for promoting the education of pharmaceutical chemists will benefit the public, by putting an end to this extensive circulation of bad medicine ?—I have no hesitation in saying that if a Bill of this description, which I have read very minutely, were passed, it would tend very much to the improvement of the trade, and be a great advantage to the public.

Sir W. G. Craig.] Do you consider there ought to be a prohibition against the sale of drugs by any person in the country, except those who were licentiates of this society ?—I should say there ought to be some such prohibition; for this reason, most of our medicines at the present day are very materially altered by the French mode of preparation; our medicines are of a different character to what they were formerly, they are concentrated medicines; and therefore I should say, at the present

day, it is more essential that a man should undergo an examination than it was at any time before.

Do you consider that it would be possible to prohibit persons in remote parts of the country from selling drugs, unless licensed by the society?—I should think myself they ought not to be allowed to sell medicines. I do not see why a man in a little country shop should compound medicines at all, except he has a knowledge of them. I know an eminent physician, when in the country, had to send a prescription 14 or 15 miles from the place, because he was conscious that it would not be made up properly at the place where he was.

But take the case of a simple dose of rhubarb, would you prohibit that?—This Bill might not apply to the sale of rhubarb, or jalap, or magnesia; this Bill is what is necessary for the protection of the public. We know that accidents continually occur. I heard of one lately from a young man doing a prescription up. If he had been an educated young man he would never have compounded the prescription at all; but he did it up as it was ordered, and the consequence was that the young lady for whom it was intended died. If he had been a man who knew his business as he ought to have done, he would have said, "I will not put this together without asking the physician."

Then your objection is not to the sale of drugs, but to the making up of prescriptions?—I think altogether that nobody ought to sell medicine except he is qualified.

Do you think it possible to get a licentiate of this society in every country village?—That would be soon overcome, the same as is done in Ireland. In Ireland if a man is uneducated, he cannot compound medicines, because he must undergo an examination; but if he will not go under an examination, how does he avoid it? Why he gets a young man who is qualified, and he writes up, "James Smith, qualified;" therefore a man in a country town would soon become so by only getting a young man who was qualified.

Chairman.] Do not you consider it of very great importance for the poor in agricultural districts to have properly qualified chemists, since, in fact, more is entrusted to the chemists in those places than in large towns?—Yes, I do. I think it is highly essential that they should be qualified men, and I am certain that that qualification would prevent the sale of such a vast amount of inferior drugs.

The purport of this Bill is to give the public the means of judging of the qualifications of chemists, if they choose to make use of their judgment?—No doubt.

It does not go further than that?—That is all we require; there ought to be a guarantee to the public.

Sir H. Willoughby.] You have introduced a drug called scammony, I think?—I have.

I think you said that it varies in quality, that it is sold of one quality at 8*s.* a pound?—From 8*s.* to 40*s.*

Would you sell the 8*s.* quality, although you know it is composed of 80 per cent. of chalk, to any one who asks for it?—We are compelled to do that, though we do not like it. A person comes and says, "I want scammony, at such a price;" and we show it to him: if a man was qualified in his trade he would not buy that article, if he really was an intelligent man.

You have stated that you think it desirable that in Great Britain no retail chemist should sell drugs, scammony included, unless he was qualified by having passed some examination?—Certainly.

How is that to prevent the party who was so qualified from buying 8*s.* scammony?—In fact it would prevent the sale of it in a very material degree; because the men would be educated to know the different qualities of scammony, whereas some are now so uneducated that they do not know it. If you were to pretend to control them they would be offended.

Is not the reason for buying it that he can get a certain kind of scammony for 8*s.* instead of giving 35*s.*; would not that account for the sale?—I do not comprehend the question.

Here is a commodity of various qualities which you say is to be got at different prices; may not the difference of price account for the sale?—There is no doubt of it; the common article pays best, but they ought not to be allowed to use it; but some buy it, thinking it is a good article, as good as can be.

But there is no reason, on your own showing, as they get the most by the lower-priced commodity, that the qualified chemist who understood his business might

not still come to you for the scammony of the lower quality?—I find that those men who know their business will not admit it into their premises.

Then in that case, you suppose it does not answer to that class of chemists to use it?—Certainly not; they will not buy it.

Chairman.] It does not answer to tradesmen in general to sell a bad article, which would be ultimately disapproved of by their customers?—Certainly not.

Therefore, upon that principle, I suppose in the end a man would come for the good article, who understood it?—I think that is the tendency.

Are not wholesale druggists admitted into the Pharmaceutical Society?—They are admitted into it.

Do you consider it is desirable for them to pass an examination, although their case is rather different from the retail druggists?—No, not compulsorily; but I should like the wholesale druggist, if he was competent, to undergo an examination; but you would not get them to do it.

Sir H. Willoughby.] I am endeavouring to find out whether you look to any public Board in order to prevent improper drugs being sold in Great Britain. Do you look to a Government inspection as the best mode of preventing it?—No; I think the best mode of preventing it would be the education, as a body, of those who buy the article; it is from the want of that education that so large a quantity of bad drugs finds its way to the public.

Then why do you refer to America as an example?—I was only telling you what they do in America; I think it would be a great improvement if the Government would not allow bad drugs to be imported; they will not allow bad fish to be sold, or bad meat to be sold, and very properly so; but here are articles of the greatest importance to the public health, without any duty paid, and with no prohibition upon them, let them be ever so bad.

Then according to your own showing, the prevention of bad drugs coming into the kingdom would be a better security than anything else?—I think education is better than anything.

But if bad drugs did not come, the evil would not happen?—Of course not, if they did not come.

In America you say they do not admit bad drugs?—In America they are so strict that they will not allow anything that is bad to go in, if they know it.

If the practice in this country was made analogous to that of America, would not that be the best mode of preventing the sale of bad drugs?—No, it would not, and I will give you a very good reason why; this article, scammony, was formerly manufactured in London, therefore there would be no difficulty in getting it again by that means.

Then in point of fact that is home made?—No, this is made abroad; they make it rather better abroad than in this country. But as long as the demand for a spurious article exists it will be fabricated in this country if it is not made abroad; a great deal was made in this country before they made it abroad.

Why will they have it?—Profit will lead some men to buy common articles.

Am I to understand you that chemists and druggists will deal in inferior articles?—Yes, at present, some will.

How could you make a law to prevent it?—I think myself that education would do it; educate these men and they will not do it.

Mr. Wyld.] You think that there ought to be an inspection of all drugs sold by retail druggists, I understood you to say, in the former part of your evidence, for the safety of the public?—I do not think that alone would do; it might do some good, but it would not overcome the evil.

Has not the Apothecaries' Company the power of inspecting the drugs?—Yes; but this examination is confined to apothecaries, and I have reason to believe that this is often evaded by keeping in prominent places some specimens of superior drugs.

Then in fact, the power of inspection, which the Apothecaries' Company have at this moment, is wholly inoperative?—It is inoperative, but might be improved.

Is the larger portion of the bad drugs which are sold consumed in London or in the country districts?—I should say formerly it was in the country; they have improved in the country; but still the great consumption, I think, is in the small towns in the country, except you go into the outskirts of London, Whitechapel, and so on; but you get the better article in the more important localities.

Since the establishment of the Pharmaceutical Society, have you found its members purchase better drugs than the ordinary mass of chemists?—It is quite a new

era; and not only that, but all the apprentices who are coming forward, who have been educated, will not have the bad drugs.

Then the public have been very much benefited by the establishment of the Pharmaceutical Society?—I think it is one of the greatest steps that has been taken towards having good drugs sold, and the safety of the public insured.

TO CORRESPONDENTS.

G. Burgess.—We regret that you were unable to obtain the "Annals," last month, through your bookseller. It occurred in consequence of all the copies being sold of the last number immediately on its publication. However, you can get it now, as we caused a fresh edition to be printed as soon as possible, after the unforeseen demand was made known to us.

A Subscriber, Wolverhampton.—Dissolve four parts of ammonia-citrate of iron, and one part of citrate of quinine in water, and evaporate.

G. B.—Your letter was received too late last month, to be answered in the September number. 1. By its specific gravity, which should be 1,296. 2. The only qualification required for the membership of the Cavendish Society, is the payment of one guinea annually. 3. Mr. Redwood is the secretary. 4. You did not treat the salt of iron sufficiently long with nitric acid, as we proved with the specimen received.

F. H. Saunders.—Vermillion is made by heating together metallic mercury, and sulphur, until combination is effected, and then subliming the proto-sulphuret of mercury which is formed, and which is vermillion.

W. D. T.—To pass the examination, a candidate must possess a sufficient knowledge of Latin to translate the Pharmacopœia correctly, as well as prescriptions.

A Subscriber, Bath.—Aurum musivum is prepared in the manner described at page 256 of the August number of this journal, under the name of bronze.

A Subscriber, Derby.—Oil of sesamum or gingelly is prepared from the seeds of the *Sesamum orientale.* It is somewhat aromatic when first obtained; but, after a year or two, it loses its pungency, when it is used in foreign countries for salads and to make paints with pigments.

W. B.—We are bound to respect the feelings of individuals when no great public good could arise from a contrary course, although the incompetency of the persons named for the offices they hold is as palpable as the sun at noon. Time alone will work the necessary reform in this matter. Under any other circumstances we should a tale unfold which would harrow up *their* souls.

Vox.—1. We do not know why he has withdrawn his name from the Journal, except it be that he is either ashamed of the Journal or himself. 2. You should make your complaint to the Council of the Pharmaceutical Society, for they are the parties who are responsible for supplying you with a commodity which you do not approve of. No doubt the editor does his best, whatever that may be.

Subscriber, Petworth.—The Surgical, Mechanical, and Medical Treatment of the Teeth, including Dental Mechanics, by James Robinson. This work is illustrated copiously with engravings.

H. S. W.—1. Try the following hair dye:—Mix equal parts of litharge and quicklime into a paste, with water, and apply it to the hair in this form the necessary time. 2. We have not space to answer this question. 3. Balfour's Manual of Botany, and Mohr and Redwood's Practical Pharmacy.

Parens.—The most essential educational qualifications for a pharmaceutical chemist are a knowledge of botany, chemistry, Latin, and a practical acquaintance with drugs—their characters, properties, and uses, which is alone to be obtained by experience and observation in a chemist's shop. Education in public schools will never form an efficient substitute for this kind of experience.

Received, "A Letter to Dr. Lyon Playfair, C.B., F.R.S., being a medical commentary on the results of the recent analysis of the Buxton tepid water, to which are prefixed a statement of the improvements now in progress at Buxton and Dr. Playfair's Analytical Report, by William Henry Robertson, M.D., &c. London, Bradbury and Evans, 1852."

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

AN INTRODUCTION TO THE USE OF THE BLOWPIPE.

BY DR. THEODORE SCHEERER,

Professor of Chemistry at the Royal Saxon Mining Academy, at Freiberg.

Historical Sketch of the Blowpipe.

For soldering, that is, for uniting pieces of metal to one another by the aid of a flux, and by means of a solid metallic alloy (solder), which is more readily fusible than the metals to be united are, workers in metals of various countries, have employed for centuries a simple instrument, the blowpipe; which brings the solder, by a strong heat, quickly into a fluid state. The most simple and ancient blowpipe was a hollow, conical, metallic tube which, at its smallest end, was bent into a right angle without a sharp corner. When used, the largest end was held in the mouth and a stream of air blown into it, which rushed out of the pointed end, like the wind from a bellows. The blowpipe can be considered as a bellows arrangement, on the small scale, fed by the mouth; and its action, as a heating agent, depends on an analogous principle to that of the ordinary bellows. In this, its crudest form and application, the blowpipe was of no importance to science. It owes its present use, as a valuable instrument for the chemist and mineralogist, as well as for the miner and smelter, to the spirit of observation and industry of several men. To show by whom this was accomplished, is the object of the following historical sketch:—

So far as we have been able to learn, Antony Swab, a Swedish mining director, who lived in the first half of the past century, was the first person who applied the blowpipe for the chemical examination of ores and minerals. The next was the Swedish mineralogist, Cronstedt, who employed the blowpipe for the recognition and distinguishment of minerals, particularly in reference to the chemical mineral system devised by him in 1758. Engeström, who translated into English, Cronstedt's work on this system, in the year 1765, added a description

of Cronstedt's method of applying the blowpipe. In the year 1773, this description was translated into Swedish, and soon afterwards into many other European languages. Little as was then known of the application of the blowpipe, it nevertheless excited great attention by the rapidity and certainty of the results obtained by its use. The new art, which appeared so easy, yet required continued practice, however made but little progress at first. An important advancement resulted from the labours of Bergmann, who employed the blowpipe for qualitative examinations in the entire domain of inorganic chemistry; and proved that, by its aid, very small quantities of mineral bodies could be detected, whose recognition in other ways had been very difficult to effect. Bergmann published his experience in a pamphlet, which was printed in the Latin language, at Vienna, in 1779, and which was translated into Swedish, by Hjelm, in 1781.

Soon after the death of Bergmann, in 1784, Gahn further advanced the methods pointed out by him. He acquired, by unremitting industry, great expertness in the use of the blowpipe; but without publishing any of his valuable experience, the greatest part of which would have been lost, if it had not been prevented by a humane willingness to communicate his art to all desirous of learning it. As a consequence of this disposition, Gahn selected the then young Berzelius, particularly as a scholar in his art, and placed him in a position to acquire all his experience, and to build further upon such a foundation. Gahn thus manifested a ready appreciation of his pupil. To increase the boundaries of his art, he could scarcely have found a more competent disciple than Berzelius. For by him was the application of the blowpipe not only perfected and extended, but particularly by his writings and his teachings, a knowledge of its use was so extensively diffused, that it has become at the present time an important part of the acquirements of every chemist and mineralogist. In the year 1821, Berzelius, published his excellent work on "The Application of the Blowpipe to Chemistry and Mineralogy," many editions of which have since appeared.

All endeavours, up to this time, were directed by the inquirer in chemical investigations with the blowpipe, to apply this instrument to qualitative analysis. Harkort, on the contrary, conceived the fruitful idea of employing the blowpipe for quantitative analysis, and was, in consequence, the founder of a new branch of blowpipe application,—the art of testing quantitatively with the blowpipe. In the year 1827, appeared the first part of his work, "Probirkunst mit dem Löthrohre," containing the silver test as the result of the researches upon which he was engaged at Freiberg. From the publication of the second part, which was to contain the lead, copper, and tin tests, he was prevented, by an appointment at Mexico, where, after a few years he died. Plattner, recognizing the importance of this extension, employed himself, during a long series of years, with the practical development of Harkort's idea. His industry and ability succeeded in bringing to completeness, the art of testing quantitatively with the blowpipe, which had been previously regarded as impossible. Plattner has laid down the results of his researches, as well with respect to qualitative as to quantitative blowpipe

testing, in his work, "Die Probirkunst mit dem Löthrohre," of which the first edition appeared in 1835, and the second in 1847.

The art of testing qualitatively and quantitatively with the blowpipe, involves such wide spreading doctrines, in consequence of the extensive improvements with which it has been enriched by the labours of Berzelius and Plattner, that a considerable time and practice are required to form an intimate acquaintance with it. This statement especially holds good for the art of testing quantitatively with the blowpipe, which is seldom well learned by the chemist, but is exclusively practised by assayers.

Of the art of testing qualitatively with the blowpipe (an art which is capable of very extensive applications), a brief yet perfect as possible exposition of its most important points will be given in the following treatise, so that it shall be possible for beginners and the less expert, with the help of this introduction, to inquire further for themselves, and to make the blowpipe by these means a useful and faithful friend.

I.

The Blowpipe Flame, and the Apparatus and Tests required for Qualitative Blowpipe Analysis.

The blowpipe flame is produced when by means of a blowpipe, under the observation of certain rules, a stream of air is blown through the flame of a candle or lamp. The flame of an oil lamp, with a broad and not too thin wick, and of a construction as will be below described, is the best for the purpose. The chief requisites for the production of a good blowpipe flame, consist first, in the constancy and duration of the stream of air; and second, in its right application and direction. That which relates to the first point, will be spoken of later in the description of the blowpipe. With reference to the second point, the operator has it in his power to allow the chemical action of the flames on the heated body, either to produce its oxidation or its reduction. The oxidation and the reduction flames, form the chief agents of the entire art of blowpipe testing. He that understands how to produce these flames of the right kind and of sufficient duration, has mastered the most difficult part of this art. A reducing flame is produced in the following way :—The operator holds the point *b* of the blowpipe (whose remaining

Fig. 1.

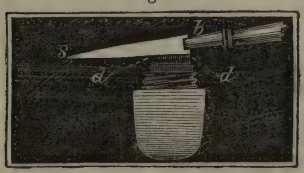
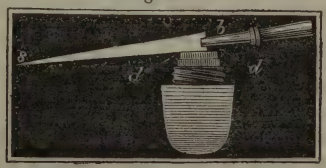


Fig. 2.



parts are here omitted from the woodcuts) parallel with the somewhat obliquely-cut wick, *d d*, and, indeed, so that the point scarcely touches the narrow side of the flame; the result will be a *bright yellow flame*, about the shape of that given in Fig. 1. An oxidizing flame (Fig. 2) is

obtained, when the operator introduces the point of the blowpipe, *b*, into the flame about one-third of the breadth of the wick, *d d*. At the same time it is advisable to blow somewhat stronger than by the generation of the reducing flame. The oxidation flame is a blue, feebly illuminating flame. The yellow colour and the brightness of the reduction flame are produced by fine particles of carbon floating in the burning gases, which particles are in an unburnt but glowing condition, until they reach the periphery of the bright cone of flame, where they are subjected to combustion. In the oxidation flame, which represents to us the blue colour of burning carbonic oxide gas, these particles of carbon are absent.

The cause of the existence of these different flames is not difficult to discover. In the reduction flame, the stream of air drives the whole flame before it rather feebly, so that a complete mixture of the burning gases with the stream of air is not effected; while in the oxidation flame, a stronger draught of air passes directly into the flame, by which it is completely mixed with the flaming gases. In the latter case, therefore, a far more complete combustion ensues than in the former.

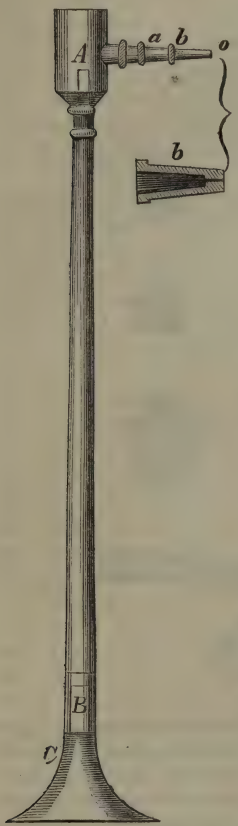
When a fragment of an oxidizable body is brought close before the point of the oxidation flame, it becomes heated, and at the same time the surrounding atmospheric air oxidizes it. When the operator hereby employs a strongly compressed stream of air, a portion of the unburnt air escapes at the point of the flame, and the oxidizing action is increased. Besides, for oxidation, the oxidation flame is also entirely employed, on account of its great intensity of heat, to expose substances to a sufficient heat for the purpose of ascertaining their fusibility. In these cases it must be observed that the point *s* is the hottest part of the flame. The reduction flame best effects its reducing action when the body to be treated is so far held in it, that it is as nearly as possible enveloped in the flame, by which means the atmospheric air is excluded. However, the operator must not bring the substance too far in the flame, as in such case it becomes readily covered with soot, which interferes with its heating, and is sometimes attended with other disadvantages.

A.—*The Blowpipe.*

The blowpipe, of the construction as usually employed at the present time, is of the form exhibited in Fig. 3, which is about the half of its natural size. It is generally made of brass, silver, or alloy of nickel, with the exception of the mouth-piece, *C*, which is horn. This mouth-piece is absent in many blowpipes, which are then required to have at *B* a silver trimming. *A* is the air tube, *A B* the air chamber, in which the air blown in from *B*, through the tube *A B*, collects and then rushes through the side tube, *a*, and escapes at its point, *o*. The air chamber, *A*, the side tube, *a*, and the blowpipe point, *b*, are separate pieces, which are stuck into one another and by friction held together. The most suitable blowpipe points consist of platinum, and are of the form shown in the woodcut at *b*, which is an enlarged drawing of one of these points, divided longitudinally in the middle. The mouth-piece, *C*, quite of the

shape of an ordinary trumpet mouth-piece, is to be pressed to the lips when the blowpipe is used. When this piece is absent, the air tube at *B* must be grasped by the lips; the former requires much less exertion than the latter. On that account, the operator, by the use of the mouth-piece, *C*, and by sufficient practice, is in a position to blow uninterruptedly from five to ten minutes. During this continuous blowing the operator breathes through the nose, uses the palate of his mouth as a valve, and presses out the air by the expanded muscles of his cheeks.

Fig. 3.



B.—*The Blowpipe Lamp.*

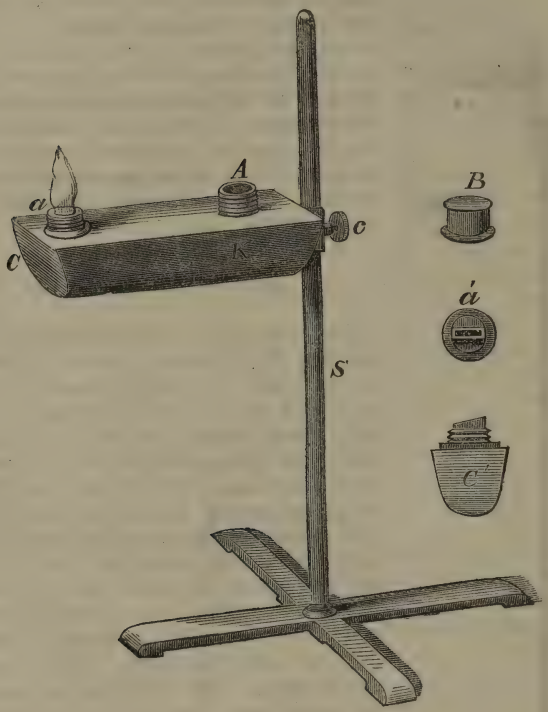
Its construction is exhibited in the accompanying Fig. 4, which is about a third of its natural size. The lamp chamber, *K*, made of tinned iron or brass, and lacquered externally black, which can be moved up and down the perpendicular rod, *S*, and fixed thereto by means of a screw, *c*, is filled with oil at the opening, *A*, which is closed by means of a screw cap, *B*; *a*, is the socket for the wick. Round the socket and the oil aperture, run the worms of screws, as at *A*, on which two screw capsules fit, as *B*, one for the purpose of extinguishing the flame of the lamp, and the other to retain the oil safely in the chamber. The principal construction of the socket, and the opening for the wick, may be perceived in the outline, *á*, and from the anterior view, *C'*, which is also to be seen in the larger drawing, at *C*. The lamp chamber, *K*, when the lamp is used, should be screwed securely, at an elevation equal to that at which the blowpipe is to be held, and a convenient place obtained on the table to support the arm which holds the blowpipe. Refined rape oil is the material most to be recommended for burning in this lamp. It gives a strong heat and a very pure flame. The blowpipe flame, which is to be obtained by the use of an ordinary wax candle, stands next in value to that of a lamp.

C.—*Instruments for holding substances to be heated.*

For holding securely substances which are to be exposed to the blowpipe flame, the operator naturally requires supports and other means to retain them firmly, which shall resist the action of heat. For these purposes, the following objects are principally employed:—

1.—*Charcoal.* A completely carbonized dense and dry charcoal,

Fig. 4.



made from pine wood, without knots, and with annual rings laying as near to one another as possible, whose good condition is readily recognized by its clear ringing sound when struck, is sawn into pieces about six inches long and two inches broad, the shape of a parallelopiped. Indeed, so cut, that the annual rings of the two long sides, of two inches wide, shall be nearly perpendicular. These sides of the charcoal are those which the operator uses. The body to be heated should be laid in a shallow cavity, made near the margin of the charcoal. The other long sides of the charcoal, which run parallel with the annual rings, or rather with their tangents, are not adapted for use, partly because they break into splinters, partly because they burn irregularly, and partly on account of their uneven condition. A substance is to be heated on charcoal, when the operator will effect its reduction or prevent its oxidation, or when the unavoidable reducing action, by contact with the charcoal is of no prejudicial influence on the intended examination.

(To be continued.)

ON MINERAL MANURES.

BY MR. LINDSEY BLYTH.

(Read before The Chemical Discussion Society.)

GENTLEMEN,

Since I announced to you my intention of bringing forward the subject of mineral manures for discussion, the fact, announced in the journals, that the Council of The Royal Agricultural Society have taken the question of manures under their consideration, so as to bring out some practical result from the speculations of the day, will invest this subject with a greater degree of interest, and I have therefore the more pleasure in bringing it before you.

The necessity of the age is progress, and agriculture has not escaped the general ordeal. Various have been the suggestions and advice offered to cultivators of the soil; but no fact is more patent than the extensive importation and use of guano. The question has often occurred to me, Why do we send to Peru for guano? This substance is the most valuable and powerful manure yet known; and, notwithstanding the enormous expense attending its importation, the increase in the produce resulting from its employment, makes it remunerative to the agriculturist who can afford to apply it to his lands.

I do not think it is necessary for our purpose to enter into the details of the science of agriculture. A slight outline, however, of the mode in which plants assimilate their organic and mineral constituents, and of the origin and composition of soils, will enable us the more readily to enter upon the discussion of the subject of manures. The fact that the soil is exhausted by cultivation, and requires the restitution of the elements carried away in the crops, in order to regain its original fertility, is acknowledged by the universal practice of manuring. The controverted question is, In what shape is the manure to be supplied? and this is the question I propose for discussion.

If a plant be burned, only a very small proportion of its original weight remains in the shape of a few grey ashes. The constituents that have been dissipated are called its organic elements, and although they assume a great variety of forms, such as woody tissue, gum, starch, sugar, gluten,—and the various active principles of which most plants have one or more, peculiar to themselves,—yet they may be all resolved into four elements—carbon, oxygen, hydrogen, and nitrogen. These having, during the process of combustion, assumed the gaseous form, it is not unreasonable to expect that we find them again in the atmosphere, and this we do, in the form of

Water, ... $H + O$
Ammonia, . . . $N + H_3$
Carbonic acid, . . $C + O_2$.

From the experiments of natural philosophers, it is more than probable that plants draw their organic elements from these sources; their carbon and nitrogen principally from the carbonic acid and the ammonia existing in the atmosphere, by means of their leaves; and also in part from the soil, these same constituents being found dissolved in the

water, which supplies their hydrogen and oxygen by means of their roots.

The ashes that remain after combustion are called their inorganic or mineral constituents; and being incapable of assuming the gaseous form, it follows that the plant must draw them from the soil.

A plant commences its growth in the soil, and after the supply stored up in the seed itself is exhausted, it draws its first nourishment from that source; and it appears from well authenticated experiments that, although the proportion of these mineral constituents is small in comparison with the organic elements, still they are essential to the increase of the plant, and perform a most important function in the assimilation of the organic elements.

These mineral constituents consist of potash, soda, lime, magnesia, phosphorus, sulphur, chlorine, silica, alumina, iron, and manganese. All these may not be found in one plant, for different plants assimilate or choose different mineral constituents, and hence the value of distinguishing how to make one plant succeed another in the cultivation of the soil, called in the practice of agriculture the rotation of crops. It is necessary for an efficient rotation of crops that the soil should contain all these mineral ingredients. The soil is the accumulation on the surface of the earth of the finely divided particles of the original rocks of which the earth is constituted, and varies in composition according to the nature of the rock immediately beneath its surface.

It is composed primarily of clay, sand, and lime, with an admixture of carbonaceous matter, resulting from the decomposition of vegetable and animal substances, known under the name of humus. A good soil presents these constituents in nearly equal proportions, and then, by ultimate analysis, it is found to contain chemically all the inorganic elements enumerated above, and into which the primitive rocks can be resolved.

It will follow then, that if by a succession of crops we remove from the soil the inorganic elements necessary to the increase of plants, we must restore them again to the earth before we can raise fresh crops. This is generally done by putting into the ground the refuse of the farm yard, or by the importation of guano, which is also the refuse of animal life, but much more rich in the mineral constituents, and hence its greater value.

If we examine the ultimate composition of guano, we find salts in it, the principal part of which may be obtained at the drysalter's; and, according to a theory expounded by Liebig, that the best manure for a plant would be the salts found in its ashes, we should fancy that nothing would be more easy than to mix these salts artificially from cheaper sources, and obtain an equally efficient product; but this is not the case.

This mineral theory of Liebig's, so apparently simple and true, has not stood the test of experience. Liebig himself has acknowledged in the last edition of his letters, that the crude application of his theory, in the shape of a commercial speculation,—the patenting of a so-called mineral manure,—was to be regretted, as having brought discredit on what is a self-evident law of nature,—that what is taken away from the

soil must be restored to it again before it can regain its original fertility. We might as well send to the drysalter for the elementary constituents of our own blood, and fancy we should be nourished by taking them into our stomachs. To supply them in their crude state to plants is equally improper.

After guano, the most fertilizing manure is the farm-yard dung heap; but this is very limited in quantity, and quite unequal to supply the demands of agriculture. If this compost be examined, the same salts as exist in guano are found, but in a less proportion, and combined with a larger proportion of organic matter, which has already undergone partial decomposition, and is capable of undergoing a still further decomposition; in this respect it also agrees with guano. Have we not here, then, a key to the solution of the mineral theory. The salts found in the ashes of a plant, do not exist in the same state in the living plant. During the combustion, their chemical affinities have been modified, and we get, perhaps, insoluble compounds in the ash, while the elements were in a soluble state in the living organism. Besides, it does not always follow that a soluble salt is assimilated by the plant. Chloride of sodium, salts of ammonia, iron, and copper, may be absorbed, and pass through a plant, and may kill it instead of being assimilated into its substance. It is necessary that the salts required by a plant, should be presented to it, not only in a soluble state, but in such a state that they can be taken up so as to form an integral part of its structure. We know the influence that a ferment in its active state exerts, in destroying the equilibrium of the chemical affinities of certain organized substances. May we not also infer that the organic matter in a manure, whilst undergoing putrefaction or fermentation, may communicate the motion produced amongst its own particles, to the saline ingredients it contains, and so modify their ordinary chemical affinities as to separate the elements of which they may be composed, and offer them in a nascent form to the plant, which is thus enabled to absorb and assimilate them. If this be a correct explanation of the superiority of guano and farm-yard manure, over artificial mixtures of the same saline ingredients which they contain, it will follow, that instead of going to the drysalter for the salts we require, we should search for them in substances of organic origin. We shall find all we want in the refuse of animal existence—and guano is nothing else. To the farm-yard heap might be added the inexhaustible supply of our sewers and our cesspools. So long as animal life continues, so long will these sources yield as rich a supply of phosphates and ammoniacal salts as can be obtained from the guano heaps. But while our towns and our rivers are polluted with this crying nuisance of the day, and the urban population is enormously taxed, to try to wash its refuse into the rivers or sea, the agriculturist is paying a still higher price to send across that sea to the other side of the world, to find what is polluting his own shores. But this only brings the question to the clashing of two great interests. The object of the townsman is to get rid of his refuse, so as to prevent it from poisoning the air he breathes; and to do this, he must convey it away as quickly as possible, either to the ocean itself, or to some stream that will convey it there, or he must add some ingredient

that will prevent the emission of the gases that he finds so noxious. If the gases exhaled by fœcal or other animal matter in a putrid or decomposing state, are assimilated by vegetables in their growth,—to fix these gases or transform them into inert matter, so that they will not undergo further decomposition, must impoverish these substances for manure, and disinfectants do this. The more powerful the disinfectant, the less valuable the manure. This is the point where the difficulty has arisen, and where the two great questions of the day—the salubrity of towns, and the employment of disinfected sewage as a manure—are at issue. It yet remains to be discovered how to retard the exhalations from fœcal matter, so as to be innocuous for the present, and yet capable of yielding food to plants as they require it.

While this question is at issue, I will state some curious facts which I have observed in examining urine, and perhaps they may help us to the solution of the larger problem. This fluid in its recent state contains urea, and phosphates of soda, lime, and magnesia, which latter are held in solution by the free acid existing in it. When kept, urine putrefies or ferments, and the urea is changed into carbonate of ammonia, which neutralizes the excess of acid, and a precipitate of the triple phosphate of ammonia and magnesia is deposited. If we add a solution of a salt of magnesia to this urine, a further precipitate of the same salt is produced. Starting with these facts, I kept some urine in an open vessel until the urea was converted into carbonate of ammonia, and then converted the carbonate into a sulphate, by adding sulphuric acid until the liquid was neutralized. A very offensive odour was, however, given off during this operation; and the sulphate of ammonia being very soluble, I was obliged to evaporate a large amount of fœtid liquor to obtain a comparatively small product. Trying to deodorize the liquor by various means, I found the addition of a mixture of the sulphates of magnesia and lime precipitated all the phosphates and nearly all the ammonia. The supernatant liquor was poured off, and on evaporation was not nearly so offensive as the former liquor, and contained a small quantity of the double sulphate of magnesia and ammonia. The first precipitate readily dried on exposure to the air, and, although certainly not inodorous, did not give off any noxious gases. I found it to consist of sulphate of lime, carbonate of lime, the ammonio-phosphate of magnesia, the double sulphate of ammonia and magnesia, and traces of organic matter, which no doubt gave the peculiar urinous smell to the compound.

About this time I was asked to remedy a most offensive smell in a stable, arising from the decomposition of urine and dung. I tried the mixture of Epsom salts and plaster of Paris, and the most wonderful effects followed; the stable-keeper was delighted. Previously, the stable was damp and unwholesome, and if closed for a few hours the ammoniacal vapours were suffocating. After sprinkling the sulphates underneath the straw and along the channel of the drain, there was no longer any smell, and, as he declared, the walls of the stable became much drier. If this be really the case, it opens up another source of manure for the farmer; for the dungheap must be

much enriched by the phosphates and ammonia fixed and swept up with the straw, which would otherwise have run to waste into the drain. I have no doubt the same salts are formed as in the case of the decomposed urine.

An economical preparation of the magnesian limestone dissolved in sulphuric acid, and with the aid of the superphosphate of lime prepared by the action of sulphuric acid on coprolite, might be employed to precipitate all that is valuable in the sewage of towns, while the supernatant liquid might be run off harmless into the ordinary channel of drainage. We should thus, to a great extent, fix the more volatile and odourous portions of the sewage; and at the same time obtain in the precipitate a manure, valuable for its containing the very ingredients required by plants, and yielding up its elements to the action of the changes of climate and temperature.

We possess in our own country an inexhaustible supply of the mineral constituents which make guano so valuable, in beds of phosphatic deposits and mountains of magnesian limestone; and we allow 4,000,000 tons of night-soil to be annually wasted on our shores. We well deserve to be taxed by a foreign government, while we neglect these precious stores at home. If agriculturists would take in hand practically the discoveries of their more theoretical brethren of the towns, and not cast aside every suggestion because of the first failure, they might render themselves independent of the Peruvian or any other government, for guano.

Perhaps there is nothing absolutely new in many of the facts I have brought before you; but a subject of such vital importance to the well-being of all classes of society cannot be too often discussed, until some practical result follow.

St. Mary's Hospital, October 1852.

ON THE ALLEGED PRESENCE OF IODIDE OF POTASSIUM IN SARSAPARILLA ROOT.

BY MR. J. B. BARNES, F.C.S.

(Read before The Chemical Discussion Society.)

In the "Annals of Pharmacy" for September it is stated, on the authority of the "Medical Gazette of Lyons," that M. Guillermond has detected, in the ashes of sarsaparilla root, iodide of potassium.

When new facts in science are made known, it is desirable, when practical, that they should be confirmed by the researches of others; and considering this to be an important question, both in a medical and chemical point of view, I was led to examine a specimen of Jamaica sarsaparilla root that I had in stock, but failed to detect iodine in it; not satisfied with the one examination, I procured, through the kindness of Mr. Dickinson, four other samples of sarsaparilla; they were respectively labelled, *Rad. Sarzæ, Lima; Rad. Sarzæ, Lisbon; Rad. Sarzæ, Hond;* and *Rad. Sarzæ, Jam.* Between four and five ounces of each sample were separately burnt very cautiously in a Hessian crucible; the resulting ash, or rather charcoal, was reduced to fine

powder, and digested in distilled water on the sand bath for about two hours; the liquid was filtered off, and the charcoal well washed with distilled water; it was, with the washings, evaporated to dryness, the residue reduced to powder, boiled for a few moments in alcohol, and filtered while hot. This filtrate was now evaporated to dryness, the residue dissolved in about half a drachm of distilled water (which would have contained, if any existed, the whole of the iodide in each separate quantity of root operated upon); it was now tested for the iodide by means of Dr. Price's very delicate test, but in each case with a negative result. The delicacy of this test is such, that Dr. Price has detected the $\frac{1}{4000000}$th part of iodine dissolved in water as iodide of potassium; therefore, it is evident from these experiments that *iodide of potassium* did not exist in any one of the five samples of sarsaparilla I have examined.

Although this test for the detection of iodine is well known, I may as well mention it. The suspected liquid is mixed with starch paste, and acidified with hydrochloric acid; a solution of *nitrite of potassa* is now added, when, if much iodine be present, a dark blue colour will be instantly produced; if a very small quantity only, as for instance, the two or three millionth part, then a few seconds elapse before the blue colour makes its appearance.

ON THE COMPOSITION OF SPERMACETI.

BY HEINTZ.

Spermaceti was regarded by Chevreul to be a compound of ethal ($C_{32} H_{33} O + H O$) with margaric and oleic acids. Later, Dumas and Stass discovered that by the action of caustic potash on ethal, at a temperature between 410° and 428° Fahr., under the evolution of hydrogen, a potash salt is formed with an acid which they named ethalic acid, whose composition is expressed by the formula, $C_{32} H_{31} O_3 + H O$, and whose melting point is 131°. More recently, Smith examined spermaceti, and believed that he demonstrated it to be nothing else than a compound of ethalic acid with ethal. The research of Heintz points out that the composition of spermaceti is much more complex; that by its saponification, it affords certainly ethal and no ethalic acid, but a mixture of an entire series of acids; and that the ethalic acid of the above constitution does not exist.

The method which Heintz pursued in his examination was, in short, the following:—One part, by weight, of dry caustic potash, free from carbonate of potash and other impurities, was dissolved in alcohol, and this solution boiled with six or eight parts of commercially pure spermaceti until it was dissolved. In this way, saponification results in a short time. The solution was precipitated with a concentrated solution of chloride of barium, and the fluid filtered while warm. The baryta precipitate was completely freed from ethal by hot alcohol. Thus was the first portion of the baryta salt obtained. The alcoholic solution yields a second portion when the alcohol is removed by distillation, and the residue extracted with ether. This salt was not soluble in ether. A third portion, in small quantity, was ultimately

obtained, when the ethereal solution was evaporated, the remaining ethal boiled for a long time with muriatic acid, the fatty mass freed from baryta dissolved in alcohol, the ethal separated by cooling pressed, the expressed fluid evaporated, and the remaining alcoholic solution precipitated with an alcoholic solution of acetate of baryta. The baryta salt hereby obtained could be washed with cold alcohol. There were now the expressed ethal, the alcoholic solution expressed from the baryta salts, and, lastly, the three baryta salts, to be examined.

Heintz found the ethal, after he had separated from it a small quantity of unsaponified cetin, to have precisely the same composition as Dumas, namely, $C_{32} H_{33} O + H O$.

In the alcoholic solution which was separated from the last-mentioned baryta salt was found, besides a small quantity of ethal, a peculiar very easily fusible matter, very soluble in all proportions of alcohol, soluble in ether, but not soluble in water, and difficult to purify from ethal. This substance is fluid at 50° to 54°. It can only be separated from ethal by placing its alcoholic solution in the cold, and expressing the ethal therefrom in a solid condition. This body remains in the solution, which, by boiling with an alcoholic solution of caustic potash and adding water by degrees, can be separated from a small quantity of fatty acids which are still present. The analysis of this substance gave the formula, $C_{18} H_{18} O_2$.

The fatty acids, which are obtained from the three different baryta salts by boiling each salt with diluted muriatic acid, Heintz has examined, after the method by which he succeeded in detecting the true nature of human fats. He applied to their partial precipitation, not acetate of lead, but acetate of baryta. As it was possible that one or the other of these acid portions might be free from certain constituents of the fatty acids, whereby their purification might be facilitated, Heintz examined each of these portions separately.

The small quantity of fatty acids which were precipitated in combination with the baryta, could only be used to show that a small quantity of oleic acid, or another acid, which, in its hydrate, had less hydrogen than carbon atoms, is contained therein. This acid portion was a mixture of different acids.

The first acid portion, separated from the ethal which contained the chief quantity of acids formed by the saponification of the spermaceti, was dissolved in boiling alcohol. The acids separated by cooling were several times submitted to the action of a powerful press to remove entirely the oleic acid mixed with them. The solid acids thus obtained were separated in different portions by partial precipitation with acetate of baryta from their alcoholic solution. The first acid portion, combined with the barytic precipitate, contained an acid, which, by recrystallization, possessed a melting point at 147° Fahr. Probably this portion contained stearophanic acid, which, however, could not be obtained in a pure condition, because it was present in too small a quantity.

The second portion gave, by recrystallization, a considerable quantity of pure margaric acid, which was known as such by possessing all its properties and its composition.

The third portion afforded, by repeated crystallization, pure palmitic acid.

From the fourth portion no more pure acid could be obtained by merely recrystallization. Heintz therefore combined it with the separated acid portion expressed from the cold alcholic solution of the fatty acids, afterwards formed a lead salt with it, which was separated from oleate of lead by extraction with ether. It was evident that the ether had extracted not pure oleate of lead, but a compound of an acid whose hydrate contained less hydrogen than carbon atoms, and which was mixed with the lead salt of another fatty acid. Besides the ether, an indifferent butter-like substance, which was scarcely soluble in boiling alcohol, and whose analysis lead to the formula $C_{28}\ H_{26}\ O_4$. It was, without doubt, not quite pure. From the part of the fatty acids which was readily soluble in alcohol, Heintz separated two acids,—myristic acid, which melts at 112°, and consists of $C_{28}\ H_{27}\ O_3 + H\ O$; and concinic acid, which melts at 94°, and consists of $C_{26}\ H_{25}\ O_3 + H\ O$. The latter is least obtained pure when the acid portion, which was the most difficult to precipitate in combination with baryta, and which melts at about 91°, is converted into a magnesia salt by dissolving it in a little alcohol with the addition of ammonia, and precipitating this solution with an alcoholic solution of acetate of magnesia. The concinate of magnesia remains dissolved in the alcohol; the fatty acid prepared from this solution can be purified by recrystallization from its alcoholic solution.

Lastly, the portion of baryta salt which was separated by ether from ethal, afforded an acid fusible at 92°. By recrystallization, its melting point rose to 138° Fahr. The acid thus obtained congealed exactly as margaric acid; no doubt this acid contained small quantities of other acids. The alcoholic solution from which this acid was separated, was saturated with ammonia, and precipitated with acetate of lead dissolved in alcohol. The lead precipitate was washed with alcohol, to separate the oleate of lead. In this case, it was found that the acid contained in the dissolved lead salt, consisted of less hydrogen than carbon atoms. It was to be considered as a mixture of oleic acid, or a fatty acid of analogous composition with other fatty acids. The acid separated from the lead salt, insoluble in ether, contained small quantities of margaric, palmitic, myristic, and concinic acids, with a fifth acid, which Heintz terms cetinic acid. It is obtained by the partial precipitation, with a small quantity of acetate of baryta, of the margaric and palmitic acids. The acids which remained in the alcoholic solution were neutralized with ammonia, and decomposed with acetate of magnesia. The fluid was separated from the precipitate from which the acid was thrown down. This process was repeated, and the acid separated from the magnesia recrystallized, until it had a constant melting point. This acid, the cetinic acid, fuses at 128°, congeals in concentric groups of pearly, shining leaves, and consists of $C_{30}\ H_{29}\ O_3 + H\ O$.

According to this research, spermaceti consists of the combinations of ethal, or cetyl oxide, with margaric, palmitic, cetinic, myristic, and concinic acids Heintz terms these compounds:—

(1.) Margethal = margarate of cetyl oxide, $C_{34}\ H_{33}\ O_3 + C_{32}\ H_{33}\ O$.
(2.) Palmethal = palmitate of cetyl oxide, $C_{32}\ H_{31}\ O_3 + C_{32}\ H_{33}\ O$.
(3.) Cetethal = cetinate of cetyl oxide, $C_{30}\ H_{29}\ O_3 + C_{32}\ H_{33}\ O$.
(4.) Myristethal = myristate of cetyl oxide, $C_{28}\ H_{27}\ O_3 + C_{32}\ H_{33}\ O$.
(5.) Cocethal = concinate of cetyl oxide, $C_{26}\ H_{25}\ O_3 + C_{32}\ H_{33}\ O$.

Besides, there appears to be a small quantity of oleic acid, as a product of the saponification of spermaceti. At the same time, a little glycerine was present without doubt, derived from the oil from which the spermaceti had crystallized. The oleic acid was probably mixed with the spermaceti as oleine. The two indifferent substances which Heintz found as the saponification products of the spermaceti, besides the ethal, are perhaps also combined with the acids found therein. Of that which is very soluble in alcohol, and on that account could be extracted from the spermaceti, if it pre-existed therein, by cold alcohol, it is certain that it is not thereby to be extracted. The pre-existence of the other is somewhat doubtful. Both bodies are formed, but only in such small quantities, from the spermaceti, that they may be considered as immaterial ingredients of it. They are, perhaps, products of the oxidation of ethal induced by the respiration of the animal. It is remarkable that by the saponification of spermaceti, a whole series of fatty acids are formed without the omission of a member. It is probable that this series embraces six members, from the stearophanic to the cocinic acid; most likely the compound richest in carbon, which is principally formed, passes by degrees, through the action of oxygen in the organism of the cetaceans, into the other members of this series, under the evolution of carbonic acid and water. This action resembles that of nitric acid on oleic acid, and on protein substances, by which a great number of acids of the same series results, which, however, certainly have lost, by the energetic process of oxidation, more carbon and hydrogen. Heintz succeeded in determining that the acid produced by the action of potash and lime on ethal, at from 410° to 428°, is a mixture of several acids, in which the palmitic acid constitutes the chief ingredient. By the twice repeated partial precipitation of the so-called ethalic acid with acetate of baryta, Heintz obtained an acid which quite resembled in its behaviour palmitic acid, and whose melting point was 142° Fahr.——*Bericht der Akademie der Wissensch: zu Berlin.*

ON THE PREPARATION OF SILICA COLOURS.

It has been found that certain natural rocks (such, for instance, as those known by the name of serpentine, containing the hydrated silicates of magnesia and iron) may be partially decomposed by acids, so that the silica which they contain may be brought into a state in which it can enter into combination with, and give permanency and beauty to pigments formed by the union of some colouring substance to that part of the mineral which remains undecomposed. This undecomposed portion forms the basis for the colours precipitated upon it, giving the desired "body" or opacity to the pigment thus formed.

Silica Blue.—To prepare this colour, 100 pounds weight of the serpentine or other mineral substance, are finely levigated, and placed in a suitable vessel, and a solution of 10 pounds of prussiate of potash in 40 pounds of water added. When these ingredients have become well mixed by continued stirring, 25 pounds of sulphuric acid, diluted with an equal weight of water, are added, and the mixture again well stirred;

after the lapse of a short time, it assumes the appearance of a pulpy mass, of a fine blue colour. In order to remove the soluble salts, about 50 pounds of water are poured on the pulpy mass, and the mixture having been allowed to remain undisturbed for about 36 hours, the supernatant liquor is drawn, and the residue washed and dried. A quantity of sulphate of magnesia may be obtained by evaporating the solution drawn off, whilst the dried residue constitutes the blue colour, which may be ground in oil or otherwise, and used as a pigment.

Silica Chrome Green.—In the preparation of this colour, 15 pounds of acetate of lead (or an equivalent proportion of another soluble salt of lead), dissolved in 20 pounds of water, are added to the blue colour obtained in the way above directed, after which, 15 pounds of bichromate of potash, dissolved in 20 pounds of water, are added. The pulpy mass, thus obtained, is well washed with water, to dissolve out the acetate of potash, and the residue dried and ground for use.

Silica Yellow.—In the preparation of this colour, 50 pounds of acetate of lead (or an equivalent proportion of another soluble salt of lead) are added to 100 pounds of the levigated mineral; after which, 10 pounds of hydrochloric acid, diluted with four times its weight of water, are added. The mass thus obtained, having been subjected to repeated stirrings, 50 pounds of bichromate of potash, dissolved in an equal weight of water, are then added. The whole is next well washed with water, to remove the soluble salts, after which, the residue is dried and ground for use.

Silica Black.—In the preparation of this colour, 50 pounds of sulphuric acid, previously diluted with an equal weight of water, are added to each 100 pounds of the levigated serpentine or other mineral, and after the mass has been well stirred, 10 pounds of logwood, and 10 pounds of nut-galls (or an equivalent proportion of any other substance containing tannin), previously boiled in 40 pounds of water, are then added, and the whole carefully incorporated. The product thus obtained, is then washed and dried for use. The manufacture of these colours, forms the subject of a recent patent.

NEW METHOD OF MANUFACTURING VINEGAR, BY MEANS OF CHARCOAL.

Dr. H. Schweinsberg has described a small apparatus, by which he obtained twice, daily, six ounces of colourless clear vinegar, with an agreeable taste, each ounce of which saturated 34½ grains of dry carbonate of potash. This apparatus consists of a glass cylinder, 10 inches high and 8 inches in diameter, filled with coarse charcoal. The charcoal is moistened with vinegar, and the apparatus is lightly covered with a glass cover, and has, at the bottom, an opening for the vinegar to run out. The apparatus is placed in a room, the temperature of which is from 64° to 77° Fahr., and every twelve hours, a mixture of one part of spirit of wine and twelve of water is poured into it. After twelve hours, this mixture will be found in a vessel, placed under the apparatus to receive it, in the shape of good vinegar. This apparatus is manufactured both on a large and a small scale, and a great number of them is used in Austria.

PHARMACEUTICAL EDUCATION.

Will it be believed, that in the nineteenth century, a pharmaceutical journal exists which propagates such imbecile nonsense, conceived in a monkish spirit, as is contained in the following paragraph :—

"The Royal College of Chemistry takes the highest range in that science. The student may here acquire a first-rate chemical education. If a pharmaceutist, he may be in danger of soaring above his vocation, by entering too deeply upon analytical and abstract chemistry. We have known this to be the case, and a distaste for the drudgery of the shop was the result. In one instance, a student, who had qualified himself at Bloomsbury Square, preparatory to joining his father in partnership, attended for a few months at the College of Chemistry, and his attention being diverted into the higher walks of the science, he abandoned his business altogether."

Here was a dreadful result to happen to a student, which must have wellnigh broke the heart of his aged parent, especially when he discovered that his son was in danger of becoming a greater man than himself. We can picture to ourselves the big tears dropping down his manly cheeks when he ascertained that his son's attention was being diverted to the higher walks of science. It would be a warning to the rising generation of pharmaceutists, and be the means of making many youths contented with the qualification they receive in Bloomsbury Square, if the Council of the Pharmaceutical Society were to engage one of our first artists in the domestic style, to paint a picture for suspension in their lecture room, portraying this abandoned youth entering too deeply upon analytical and abstract chemistry, despite the grief and remonstrances of an indulgent father.

There is one thing in which we perfectly agree with the writer of the article, from whence the above paragraph was taken, namely, such is the education afforded by the School in Bloomsbury Square, that there is not the remotest chance of any similar calamity overtaking any youth trained exclusively there; because the seductive walks of the higher branches of chemistry are kept sedulously from his view. For the pharmaceutical student to learn, according to this safe system of education, that sulphate of copper is composed of sulphuric acid and oxide of copper, is to render him willing to submit to the drudgery of the shop, because sulphate of copper is an article employed in pharmacy; but to learn that nitrate of copper (a salt not used in pharmacy) is constituted of nitric acid and oxide of copper, is to give him a zest for the forbidden fruit of knowledge, which will end, in all probability, as the above-quoted authority proves, in a profligate career of devotion to abstract science.

Why did not the authors of the Pharmacy Bill have an especial

clause inserted therein, interdicting pharmaceutical students from entering those dens of destruction, the Royal College of Chemistry, University College, and the laboratories of some of our medical schools, which are superintended by such dangerously clever men and capable teachers as Dr. Stenhouse, who has done more to extend our knowledge on chemical subjects interesting and important to pharmaceutists, than may be expected from the School of Pharmacy, in Bloomsbury Square, in a century,—presided over, as it is, by a dull mediocrity of mind, that would limit the boundaries of science, that regards much knowledge as a dangerous thing, and that cannot brook the scientific superiority of other men.

We have given mortal offence in some quarters, for satirizing the fatuitous words and deeds of those who have dexterously appointed themselves the guardians and managers of the Pharmaceutical Society. But we can tell these thin-skinned individuals, that as long as we have a public duty to perform, we shall execute it fearlessly, and choose the weapons which we deem most suitable to meet the occasion. If they wish to reduce us to silence, let them relinquish their follies, and our ridicule must cease; for no man, or body of men, can be held up to ridicule, unless he or they supply the raw material themselves, in the shape of puerile sayings and doings, or pettyfogging proceedings, or something worse.

There is but little hope in this country of the pharmaceutist making his profession respected by his contributions to science, whilst these drivelling notions and practices prevail in the Pharmaceutical Society. In fact, we should lose all hope for the future progress of pharmacy in this country, did we believe, which we do not, that these narrow-minded views, supported by self-interest, were common to the pharmaceutical community at large.

With all their cunning, the authors of the article above quoted, as well as of others of a similar strain, in the same journal, do not perceive that by drawing distinctions between the School of Pharmacy and other educational chemical establishments, they are writing a condemnation of the very school they wish to support; because, to make distinctions at all, they can be only unfavourable ones to the reputation of the School of Pharmacy in Bloomsbury Square, in consequence of its inferiority. This suicidal course shows what men will venture upon when they have a lame cause to advocate. They hope, or rather believe, that these miserable subterfuges will be swallowed by the unsuspecting pharmaceutical student.

Acquainted as we necessarily are, from our very position, with the educational wants of the pharmaceutical student, and accidentally with the nature and qualities of the various chemical and pharmaceutical

schools both at home and abroad, and having no interest in one school more than another, the pharmaceutical student may place implicit reliance on our advice, when we warn him, if he really wishes to acquire a sufficient knowledge of chemistry, to carry on his profession with credit to himself, and thus to elevate the character of the whole body of pharmaceutists, not to place himself under the guidance of those who, in employing a crafty devise to allure him within their portals, proclaim their own incompetency to teach; but rather let him seek for his education in those establishments, conducted by men of known character and ability, where, if he have an average ability, he may learn chemistry as a science, as a philosophical whole, instead of fretting away his time upon any of its petty applications, which neither now nor hereafter will bear any fruit, in a mental point of view, or in the sordid one of success in business.

PHARMACEUTICAL MEETINGS FOR SCIENTIFIC PURPOSES.

Every one conversant with the proceedings of the scientific evening meetings of the Pharmaceutical Society, is aware of the miserable existence which these meetings have dragged on for some years, with one solitary exception, which occurred during the presidency of that worthy man, Mr. Ince, who unostentatiously devoted his energies, not for his own self-glorification, but to encourage and develope the latent talent of the pharmaceutists of this country. Well would it be for the Pharmaceutical Society, if there were a few more such men as he on its Council. We were painfully struck with the contrast which his conduct exhibited in the management of these meetings, and that manifested by those who profess to have endeavoured to render the meetings of the present year as well as those of former ones, equally flourishing.

Many, no doubt, attended the first meeting of this year, in the anticipation of hearing, as announced, a few suggestions with regard to a mode of more effectually increasing the value, interest, and character of these scientific meetings. How grievous must have been their disappointment, when they learned that the speaker omitted the suggestions altogether, and indulged, with bad taste, in pronouncing an eulogy on his own exertions, disinterestedness, and zeal,—made a boast that he had violated a regulation of the Council, for admission of visitors, which was instituted to remedy a well known and often practised abuse of that privilege,—and was evidently converting a scientific meeting, or what should have been one, into a preliminary elocution class, for ambitious middle-aged gentlemen to acquire ex-

perience in extemporaneous oratory, who are desirous of addressing the senate, or unburthening their minds before a vestry.

The audience were also favoured, on this scientific occasion, with some very strong commendations on the value of Mr. Redwood's teaching, delivered by himself, for a purpose which was palpable to everybody present, and which showed what an ungraceful position he was reduced to, when he was obliged to sound his own trumpet.

Then followed Mr. Bentley, professor of botany, who took that opportunity, in consequence of inquiries he had received, of contradicting a statement that we published some months since, that he delivered a more complete course of lectures on botany at the medical school of the Middlesex Hospital, than he gave to the pupils of the Pharmaceutical Society. Hearing this contradictory statement from Mr. Bentley's own lips, we were disposed to make a retraction, if, upon due inquiry, we found ourselves in error with regard to our original statement, which, by the way, we derived from the very best source, namely, from Mr. Bentley himself; but, to our regret, we find that we are obliged to adhere to the fact which we first made known, as an argument against the continuance of the school in Bloomsbury Square, to wit, that Mr. Bentley's course on botany consisted of fifty lectures, when delivered to the medical school; and, by agreement with the Council of the Pharmaceutical Society, of twenty-five lectures, when delivered in the School of Pharmacy, which he generously extended to between thirty and forty, of his own free will.

After such an exhibition, as above described, is it surprising that the so-called scientific meetings of the Pharmaceutical Society should be a jest with medical men, whose presence is so much desired by the Council, and an object wearisome or distasteful to the members of the Society? Is it astonishing that men who desire friendly discussion on pharmaceutical or chemical subjects, should forego their inclinations, or form themselves into another society? However much we may lament that a state of things should exist, which drives members from the parent Society, because division is always weakness to all parties, we cannot but rejoice that some of these seceding members should have founded a prospering but unpretending society, termed "The Chemical Discussion Society," the meetings of which are held bi-monthly, during the greater part of the year. It possesses an admirable code of laws, which are conceived in the most friendly spirit, and are calculated to kindle an interest in its welfare in all its members, and to encourage their active participation in its proceedings.

From all we learn, many valuable contributions, which have been read before this Society, have been lost to the pharmaceutical community, partly from the modesty of their authors, and partly from the

want of an authorized channel for publishing them. However, we hope, for the future, to remove this want, by placing our pages at the disposal of this Society.

There is, unfortunately, such an intense spirit of egotism in the leading members of the Pharmaceutical Society, that everything must be done by them, every suggestion must arise from them, and, in short, the credit or honour of everything connected with the Society must be theirs, or it may perish. They are anxious that the Society should prosper, but its prosperity must be theirs. They desire that the scientific proceedings should occupy a high place, but only through their agency; and that if any disgrace or short forthcomings should be attributable to the Society, then any or everybody should be to blame but themselves. Adopting the constitutional fiction attached to the kingly power in England,—they consider they can do no wrong, and are, by prescriptive right, the only fountains of honour and the sole distributors of patronage and place.

FACTS AND DISCOVERIES IN SCIENCE.

Pagliari's Styptic Solution.—Signor Pagliari, a pharmaceutist residing in Rome, has invented a styptic solution of remarkable power and efficacy, which, if experiments prove to deserve and maintain the high reputation it has already acquired, will henceforth be a most valuable therapeutic agent in the hands of surgeons and medical practitioners. For some time, Signor Pagliari preserved the secret of its composition; but he has quite lately made this known to the public. The following is the formula for the preparation of this styptic:—

Tincture of gum benzoin, ...	8 ounces.
Powdered alum, ...	1 pound.
Water, ...	10 pounds.

These ingredients are to be boiled together, for six hours, in an earthen vessel, which should be glazed withinside; the water, as it evaporates, being replaced by additional boiling water, so as that the ebullition may be continued without interruption, and during this process, the compound should be carefully and assiduously stirred. The liquid is then to be filtered, and carefully preserved in bottles provided with glass stoppers. When well prepared, the styptic solution is clear, of a pale yellow colour, with a strong aromatic smell, and not very styptic or astringent to the taste. It is said, that a single drop of this solution added to the human blood in a vessel, produces an instantaneous coagulation, which may be increased in density, by increasing the number of drops of the solution to the proportion of the blood, so as to produce even a dense, black coagulum.

Maguey, or Agava Americana.—This plant is spoken of in the Dispensatory of the United States, as the American aloe, and is said to be laxative, diuretic, and emmenagogue. The juice of this succulent plant contains a considerable amount of vegetable and saccharine matter.

The plant itself is indigenous in most parts of the United States, most abundantly, however, in New Mexico and California. In Mexico, it is well known as the plant from which the inhabitants of that country manfacture their favourite drink, the *pulque*. The mode in which it is used medicinally is the following :—The leaves are cut off close to the root ; they are placed in hot ashes, until thoroughly cooked, when they are removed, and the juice is then expressed from them. This is then to be strained, and may be administered to the patients, with or without being sweetened with sugar. It is given in doses of two or three ounces, three times a day. It is not unpleasant to the taste, it usually agrees well with the stomach, and acts easily upon the bowels. After the leaves have been cooked, the cortical part near the root may be removed, and the white internal part may be eaten, as it appears to be a wholesome and nutritious article of diet.

Dr. Glover Perin, of the United States' army, says he has been informed, on good authority, that several tribes of Indians, in New Mexico, employ it in this manner ; and on this account, he thinks it may prove invaluable to the army at many of the extreme western stations, where other vegetables cannot be procured. The use of the leaf of the plant in this manner, as an article of diet, he believes will contribute greatly to prevent incipient scurvy. He is of opinion, that great benefit will result to the army of the States, from the introduction of the maguey as a therapeutic agent in the treatment of that disease, as, from his observation of its effects on cases occurring in those under his command, he is inclined to place it far above the remedy which, hitherto, has had the highest place assigned to it, for the prevention and cure of scurvy, namely, the lime juice.

Dupuy's Compound Fluid Extract of Senna and Dandelion.—This fluid extract has acquired some reputation as an antibilious purgative amongst the practitioners in certain parts of North America, who have used it with much success in the diseases of children, who take it readily, as well as in those affecting adults, where an antibilious purgative is required ; it seldom produces nausea or griping, and is not likely to be followed by constipation. The following is the formula for its preparation :—

Senna leaves, ...	2 pounds.
Torrefied dandelion root, ...	1 pound.
Chamomile flowers, ...	4 ounces.
Sugar, ...	20 ounces.
Carbonate of potass or soda, . . .	1 ounce.
Oil of gaultheria, ...	½ drachm.
Alcohol, ...	2 ounces.
Water, ...	2 quarts.

The dried plants, previously reduced to coarse powder, are to be mixed with the water holding the alkaline carbonate in solution ; the mixture is then to remain twelve hours, after which it is to be introduced into a percolator, and water is gradually to be added until a gallon of liquid shall have been collected ; this is to be slowly evaporated to twenty ounces, by means of a water bath ; the sugar is then to be added, and the whole filtered ; and lastly, and when quite cold, the oil

of Gaultheria, previously dissolved in the alcohol. By preparation, according to this method, a kind of saponification takes place, which allows of the more ready solution of the active principle of the senna in the aqueous vehicle. Torrefied dandelion root is recommended, as it is considered to give to this fluid extract some additional value, on account of its peculiar action on the hepatic organs.

Dahlia Paper.—Dahlia or georgina paper is prepared by bruising the petals of the red dahlia, with a little water, expressing the juice and filtering. This is then applied to white filtering paper by means of a pencil brush. This paper, which may replace the litmus paper, may be rendered of a green colour by the application of an alkaline solution, or a red colour by an acid solution. Should the colour of the juice of the red dahlia not be sufficiently deep for the purpose for which it is required, it may be made more concentrated by evaporation, and then filtered before it is used.

Test for Cod-liver Oil.—Sir James Murray, in a paper communicated to the Surgical Society of Ireland, says, that he has for some time applied a very simple test for the detection of adulteration of this animal oil with any vegetable oils. It is this:—Some years ago he noticed, in a factory where cotton was manufactured, that where an animal oil was employed in the lubrication of the machinery, the brass works did not become green, as they usually do when vegetable oils are employed for the same purpose; he applied this observation to cod-liver oil, and taking a small copper vessel, in which he was careful to place the *pure* oil, in a sand-bath, in which no salts of copper were produced, whilst in the *adulterated* specimens of the same oil, placed under similar circumstances, a quantity of cupreous salts made their appearance, indicated by a green margin round the vessel, thus denoting the admixture of *vegetable* oil of some kind with the animal or cod-liver oil.

Adulterations of Dover's Powder, and of Compound Jalap Powder.—In the same paper as that referred to above, Sir James Murray states, that Dover's powder, or the compound powder of ipecacuanha of the Pharmacopœia, is occasionally adulterated with potassio-tartrate of antimony, and linseed meal; and that the compound powder of jalap is also occasionally adulterated, or rather composed of jalap and alum. It is not for us to deny the accuracy of this statement of Sir James Murray, in reference to some adulterated and impure specimens of these medicines which may have been placed in his hands; but of this we are confidently certain, that no respectable pharmaceutist, or chemist and druggist, would so rashly, so foolishly peril his reputation, by such improper preparations of these valuable medicines,—medicines which are almost constantly, indeed daily, prescribed by the physician, and which are prepared according to a given rule, with no very greatly expensive ingredients.

Juniper Tar Soap.—This soap is made by distillation from the tar of the wood of the *Juniperis communis*, by dissolving this spirit in a fixed vegetable oil, as that obtained by expression from almonds or olives, and forming a soap by means of a weak soda-lye, after the customary manner. This yields a moderately firm and clear soap, which may be readily used by application to parts affected with erup-

tions at night, mixed with a little water, and carefully washed off the following morning. This soap has lately been much used for eruptive disorders, particularly on the Continent, and with varying degrees of success. It is thought that the efficient element in its composition is a rather less impure hydrocarburet than that known in Paris under the name *huile de cade*. On account of its ready miscibility with water, it possesses great advantage over the common tar ointment.

CITRIC ACID.

The present high price of this article suggests the utility of further researches on obtaining it from the fruits and plants of our own country. Some years since, M. Tilloy, of Dijon, obtained a large quantity of citric acid by submitting gooseberries to the following treatment, a knowledge of which may perhaps serve some of our readers, in their investigations in this subject:—

The gooseberries were first crushed and fermented, and when the fermentation was finished, the mass was distilled and the alcohol collected. The contents of the still were then placed in a suitable vessel, and allowed to settle; after which, the clear liquor was drawn off, the sediment filtered and pressed, and the clear liquor thus obtained added to the former. The whole fluid was then heated, and saturated with carbonate of lime. The citrate of lime thus obtained was much coloured, and mixed with malate of lime. It was then diluted with water to the consistency of thin broth, and decomposed, with the aid of heat, by the addition of the requisite quantity of sulphuric acid, diluted with twice its weight of water. The acid liquor resulting from this treatment, and which is a mixture of citric and sulphuric acids, was again saturated with carbonate of lime, the precipitated citrate of lime well washed, pressed, and treated with the required proportion of sulphuric acid. The liquid citric acid thus obtained was then decolorized by animal charcoal, evaporated, and crystallized.

In these experiments, M. Tilloy obtained, from 6173 lbs. of gooseberries, 40 gallons of spirit, specific gravity 0.930, and 46¼ lbs. of citric acid.

The lemon juice used in the manufacture of citric acid, is generally a black and almost treacly fluid, obtained by boiling down the expressed juice. The crystals of citric acid are more difficult to decolorize than those of most other vegetable acids.

Chloride of lime is employed in the South of France to bleach the citrate of lime previous to its being decomposed by sulphuric acid, and it would appear that this application of the chloride possesses also the useful purpose of greatly assisting in the removal of the mucilaginous matter with which the citrate of lime is contaminated, and which is oftentimes an hindrance in the crystallization of the acid. We are not aware of the application of chloride of lime for this purpose in the English manufactories of this acid,

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Reviews.

THE PRESCRIBERS' COMPLETE HANDBOOK: *Comprising the Principles of the Art of Prescribing; a Materia Medica, containing all the principal Medicines employed, classified according to their natural families, properties, and uses; and a concise Sketch of Toxicology.* By M. TROUSSEAU and M. REVEIL. Edited, with Notes, by J. BIRKBECK NEVINS, M.D. London: Hippolyte Baillière. 1852.

THIS work, although originally written as a guide to the French prescriber, will be found extremely useful to the English dispenser, and especially when he requires information on French formulæ and prescriptions. It contains an extensive table of the various medicinal simples employed in pharmacy, with their French, English, and Latin synonyms, forms of administration, doses, and therapeutic action.

The authors give a short, yet instructive sketch of pharmacy, which affords a good idea in what manner this art is practised on the other side of the English Channel. In this work there is an extensive array of magistral prescriptions, which the medical practitioner will be more able to appreciate than we are. There is also a very good outline of toxicology which will prove very serviceable for refreshing the memory in cases of urgency.

Dr. Nevins appears to have spared no pains to render this Handbook serviceable to the English reader, not only by the evident accuracy of the translation, but also by giving, in the numberless instances where weights and measures are spoken of, their English equivalent values in juxta-position with the French ones.

Next to writing a good work, the greatest service that a literary man can perform for science, is to give a faithful version, in the vernacular tongue, of a valuable book of exotic origin.

A FORMULA FOR A CASTOR OIL ELECTUARY.

BY SEPTIMUS PIESSE.

MANY persons' stomachs revolt at taking castor oil in an undisguised form. To overcome this repugnance, it has been the practice to administer it in the shape of an emulsion, which involves a large increase in bulk of the dose to be taken, as well as the employment of a considerable quantity of gum or the yolk of an egg, to form the emulsion. To disguise the castor oil, to give it in a condensed form, and to diminish, as much as possible, the quantity of the excipient, the following formula has been devised:—

Take of Castor oil, ...	3 ounces.
White soft soap, ...	1 drachm.
Simple syrup, ...	1 drachm.
Oil of cinnamon, ...	6 drops.

Rub the soap with the simple syrup in a mortar, and then add

gradually the castor oil, with constant trituration, until it is thoroughly incorporated with the above ingredients. Finally, mix with the electuary thus formed, the oil of cinnamon, or any other essential oil that may be preferred. By these means, a gelatinous electuary will be formed, which is rather palatable than otherwise, and nearly equals, bulk for bulk, castor oil in strength. The quantity of potash present in a dose of this electuary is only a homœopathic dose, and, consequently, not likely to produce a bad result in any case, even when its use should be contra-indicated.

THE CHEMISTRY OF THE SUB-ORDER SPIRÆA.

BY DR. W. WICKE.

Salicylous acid, heretofore only detected in the distillate obtained from the flowers of the *Spiræa ulmaria*, exists, as I have found, also in the herb and the root of this plant. In the distillate of these parts it is to be detected by its odour, its intense violet colour with chloride of iron, and its yellow colour with alkalies. From the concentrated extract made from the rhizome, pure salicylous acid can be obtained in the form of oily drops. Also three other herbaceous *Spiræas*, namely, *Sp. digitata*, *Sp. lobata*, and *Sp. filipendata*, exhibit the same reactions in their green parts as the *Spiræa ulmaria*. I examined also the watery distillates of some shrubby and arboraceous kinds of *Spiræas*, namely, the *Sp. aruncus*, and *Sp. sorbifolia*, and obtained therefrom, instead of salicylous acid, to my surprise, prussic acid. This fact, which proves that these plants contain amygdaline, appears to me to be very worthy of notice, inasmuch as botanically the arboraceous *Spiræas* approach the *Pomaceæ*, and the *Amygdalaceæ*, which are characterized by containing amygdaline. It thus also shows, by the presence of a peculiar body, and by the existence of a definite chemical occurrence in these plants, a transition of one sub-family of the *Rosaceæ* into another.

The blossoms of the *Sp. aruncus*, carefully separated from their panicles, gave no prussic acid by distillation, although this acid was found in the herb. In all the researches, prussic acid and salicylous acid were never found to exist together in the same distillate. In some arboraceous species neither acid was present, at least in the bark and leaves of *Sp. lævigata*, *Sp. aculifolia*, *Sp. ulmefolia*, and *Sp. opulefolia*.

The facts that amygdaline never appears in another sub-family of the *Rosaceæ*, and that salicylous acid is a characteristic ingredient of the herbaceous *Spiræas*, give rise to interesting considerations.

It must be remarked that the leaves of *Sp. sorbifolia*, and of *Sorbus aucuparia*, appear externally so much alike as if they were cut after one pattern, and that the leaves of *Sp. aruncus*, which belong to the so-called manifold compound leaves, have typically the same character of form. I consider this resemblance of the leaves of some value, because, without doubt, these organs are important agents of the vital activity of plants.

If it be allowed that salicylous acid is derived from salicine, in the economy of the plant, some interesting comparisons arise therefrom.

The resemblance between the chemical relations of salicine and amygdaline is well known. Both are evidently conjugated compounds; both contain sugar, or a compound which, by its decomposition, yields sugar; and both undergo this remarkable decomposition in contact with emulsine. The salicine breaks up into sugar and saligenine, and the amygdaline into sugar, prussic acid, and oil of bitter almonds. By the introduction of two equivalents of oxygen into saligenine, it is changed into salicylous acid, with the evolution of two equivalents of hydrogen. This acid can also be obtained in this way directly from salicine.

These and other analogous chemical relations of amygdaline and salicine, together with the resemblance in the structure of these plants, lead me to regard these relations as a kind of isomorphism in the organized kingdom.——*Annalen der Chemie.*

EXTRACTUM COLOCYNTHIDIS P. L.

In consequence of some very alarming effects having been produced by the simple extract of colocynth of the new edition of the London Pharmacopœia, when administered internally, in doses such as medical men have been in the habit of prescribing, upon the assumption that it was no stronger than that prepared according to the formula of the previous edition, we deem it is necessary to inform our readers that it is a highly drastic purgative, consisting nearly of pure colocynthine, and that it should not be given in doses larger than one grain, without the attention of the prescriber being called to this fact.

The reason of this great disparity of strength between these extracts is made evident when the two formulæ are compared. In the new edition, the colocynth is directed to be macerated with cold water, by which means little else than colocynthine is dissolved out of it by the water; whereas in the instructions of the former edition, the colocynth is to be boiled for six hours with a much larger quantity of water; hence, much inert organic matter is extracted from the colocynth, which, so to speak, dilutes the colocynthine when in the form of extract.

From the same cause, the compound extract of colocynth is very much increased in strength when prepared according to the new Pharmacopœia; and we are informed that similar disagreeable consequences have arisen from its administration, to those which we have mentioned with reference to the simple extract.

A PURPLE-RED INK FOR MARKING LINEN.

The place where the linen is to be marked is first wetted with a solution consisting of three drachms of carbonate of soda, and three drachms of gum arabic, dissolved in an ounce and a half of water, then dried and smoothed. The place is now to be written on with a solution composed of one drachm of chloride of platina dissolved in two ounces of distilled water, then allowed to dry. When quite dry, the writing is to be painted over with a goose's feather, moistened with a liquid consisting of one drachm of protochloride of tin dissolved in two ounces of distilled water.——*Böttger's Polyt. Notizblatt.*

CHEMICAL EXAMINATION OF NAPLES SOAP.

A. Faiszt has submitted this celebrated shaving soap to analysis. He states that it is made by saponifying mutton fat with lime, and then separating the fatty acids from the soap thus formed, by means of a mineral acid. These fatty acids are afterwards combined with ordinary caustic potash to produce the Naples soap. He found that 100 parts of this soap contained

	Parts.
Fatty acids, ...	57.14
Potash combined with the fatty acids, . .	10.39
Sulphate of potash, chloride of potassium, with a trace of carbonate of potash, . .	4.22
Silica, &c.	0.46
Water, ...	27.68
	99.89

——*Gewerbeblatt aus Württemberg.*

ARSENIC IN SULPHURET OF ANTIMONY.

H. Wachenroder has shown, by a number of analytical examinations, that most of the so-called pure sulphuret of antimony found in commerce, contains arsenic, in proportions varying from $\frac{6}{100}$ to $\frac{6}{10}$ per cent. He has given the details of the examination of five specimens, derived from different sources, all of which contained arsenic.

EXTRACTS FROM THE EVIDENCE ON THE PHARMACY BILL, DELIVERED BEFORE THE SELECT COMMITTEE OF THE HOUSE OF COMMONS.

Henry Ancell, Esq., M.R.C.S., called in, and examined.

Mr. Farrar.] Do you agree generally in the objections which have been urged against the Bill?—I agree very closely with what has fallen from Dr. Cormack just now.

Then you admit, I presume, that it is desirable to improve the education of chemists and druggists?—I am a friend to the general education of chemists and druggists certainly.

Do you think that that education ought to comprise chemistry, pharmacy, materia medica, and botany?—Certainly not materia medica, as we understand the term conventionally.

Are you aware that in the lectures which have been recently introduced for chemists and druggists, the course of materia medica has been so altered as to suit their particular acquirements?—I am aware that it has been considerably altered; that it is different as respects the chemists and druggists and the medical practitioners, but still it implies a certain amount of knowledge of the virtues of medicines and the names of diseases.

What is the meaning of the term "materia medica?"—The materials or articles employed in medicine.

Ought not a chemist and druggist, do you think, to be acquainted with the materials which he sells, many of which have poisonous or other strong properties?—In a wholesome condition of the medical profession, with the duties of the chemist and druggist properly defined, no doubt, I would answer that question in the affirmative; but I apprehend in reference to this Bill that that is not exactly what is intended, and I should say it is dangerous to give to the chemist and

druggist the status, and an assumption of knowledge which after all must be a limited knowledge of the virtues of medicine, in the present state of the profession.

But seeing that that is restricted to his own particular department, and that toxicology is omitted in order to prevent any misunderstanding, do you think absolute ignorance is better than that amount of knowledge which is proposed by this Bill?—I do not quite understand the premises.

The premises are, that the branches of knowledge which it is proposed to teach, do not comprise the theory and practice of medicine; on that hypothesis do you consider that absolute ignorance in chemists is a smaller evil, than the introduction of a Bill of this description for their improvement?—I should say certainly not; but I cannot grant the premises under this Bill, because you do not define what materia medica is; I will explain that materia medica, as we understand it, is a knowledge of the properties of medicines, their doses, and their application in the treatment of diseases; I understand from the Committee, that there is some limitation in the amount of knowledge that is to be taught under this Bill, but the definition of the term "materia medica," and the amount of knowledge of it which is to be required, will rest, I apprehend, with the Council of the Pharmaceutical Society.

Mr. Wyld.] On the examiners?—On the examiners.

Chairman.] You are alluding to the courses of materia medica, instituted for the express benefit of the medical profession in the medical schools; but seeing that there has been no pharmaceutical school in this kingdom until within the last few years, is it to be expected that in the absence of such a school the courses of materia medica should have been specially adapted to the chemists and druggists, and would not a Bill of this description, which raises the demand (if I may use the term) for a chemical materia medica course, have a tendency, in your opinion, to induce the lecturers to alter their lectures to suit that demand?—I think that for any body of men so partially educated in medical matters, to hold a diploma which implies that they have been examined in materia medica, would be a very dangerous thing for the public. I think the present state of ignorance under existing circumstances, is less dangerous, and fraught with less evil to the public than such a status as you would give the pharmaceutical practitioner under your Bill. I go upon this principle, that it is better to send the poor, or those who would go to the chemist or druggist, to an old woman who knows nothing but what her innate sagacity teaches her, than to a partially educated man, who is a *quasi* medical practitioner, to deal with the very violent and active agents with which he necessarily deals, behind his counter.

Do chemists and druggists at the present time practise medicine, or prescribe to any great extent?—That question must be answered certainly, in the main, in the affirmative; but there are very considerable exceptions; it rests wholly with the chemists and druggists. Take, for example, Godfrey and Cooke's; they would not think of answering a question to an individual as to what is good for a complaint. Take William Allen's, of Plough Court; they would not think of prescribing for a pain or an ache, were it ever so simple; it would not answer their purpose. But it has been stated in this room, that in smaller concerns, in the back streets of the Metropolis and small towns, the reverse would be the rule, because it is the interest of the party. I know from practical observation, and from a thorough knowledge of the subject, that it rests wholly with the individual behind the counter whether he chooses to practise as a medical practitioner or not.

Does that practice exist more among the superior chemists and druggists, or among those who are very little educated?—That is a question that cannot be answered quite directly; it depends upon the conscience of the individual. A man in a low neighbourhood, who is continually applied to to prescribe medicines, if he be a very ignorant, but at the same time a very conscientious man, will either not do it at all, or, if he does it, he will do it in a very limited degree; but if he be a reckless man, he will do it in a great degree, and, unfortunately, the interests of mankind will prevail; and many do pursue the latter course, and a great deal of evil results from it.

Is not an uneducated man more likely to be ignorant of the responsibility he incurs in doing that for which he is incompetent, than one who has been properly trained, in the apprehension, that, for a responsible duty a corresponding education is required?—No doubt; but more evil, in my opinion, would be done by partially

educating in medicine a large body of men, than is now done by the grosser ignorance of the few.

Mr. Wyld.] Have you any objections to state to the Bill?—I have this general objection, which has been offered by Dr. Cormack and others, that the Bill will have a tendency to create a closer competition between the pharmaceutical chemists, as they will be termed, and the humbler classes of the medical profession.

Mr. Hindley.] The general practitioners?—The general practitioner; and that the result of that will be, that there will be a large proportion of counter practice, and not only that, but that practice will be gradually done by the pharmaceutical chemist. I believe more evil will be done by the extension of counter practice under that kind of authority, than any possible good that can be done by an enlarged education of those who so practise, just upon the principle, that you cannot give them education enough to render them safe practitioners even as far as they go.

Chairman.] Are you aware that any chemist who may visit a patient after this Bill shall have passed, will, by the existing law, be liable to a prosecution by the Apothecaries' Company?—Not if he could show that he was practising as a pharmaceutical chemist. If a physician, for instance, requested his patient to send for a pharmaceutical chemist to carry out his views and objects, that pharmaceutical chemist would not be amenable to the Apothecaries' Company.

Did you ever hear of a physician sending for a chemist?—No; I have known of pharmaceutical chemists going to the patients of physicians to answer questions respecting their prescriptions, and to perform other offices; and I believe that that kind of duty would immediately be very materially extended under this Bill.

What offices do you allude to; applying leeches?—Yes.

Do you think that is an operation that a chemist ought to be restricted from performing?—I do think so; for I think that if a chemist goes to apply leeches he is led to alter the prescriptions of the physician, or to prescribe for the patient.

But in the absence of the chemist, the cook or housemaid would apply the leeches?—No doubt of it.

Then does the applying of leeches imply medical practice?—No; if the cook were asked a question about medical practice she could not give any information; but a pharmaceutical chemist would be attended to.

Mr Hindley.] Your general objection to the Bill is, that you think it would cause the pharmaceutical chemist to trench upon the practice of medical practitioners?—I think you must take society in two points of view with reference to this Bill; in the upper classes the effect of it would be, that gradually the pharmaceutical chemist would take the place of the existing general practitioner or the former apothecary; at first, he would perform trifling offices for the physician and pure surgeon, the prescribing practitioner, and then that would gradually be extended. I think, in reference to the whole subject, that the effect of the Bill would be just that which has been described by Dr. Cormack. Then my impression is, that the time would come, and very shortly, when you would be asked for a new Bill, on the ground that the public had sanctioned the practice of the chemist and druggist, or rather of the pharmaceutical chemists; and that the same arguments would prevail, or nearly so, which prevailed in 1815; and that the Legislature would be told, that if it was an evil, the practice was in the hands of this class of practitioners, and that therefore they must be better educated; and you would then be asked for a Bill to sanction their being educated in anatomy; that would be the first thing that would follow this Bill as an almost necessary sequence; and I should rather call this a precursory Bill to institute a new class of practitioners.

Mr. Wakley.] Suppose the provision was put at the end of clause 11, which I have suggested, and the examiners were postively interdicted from examining the candidates as to their knowledge of the theory and practice of medicines and surgery, do you believe that the effect of the Bill would be such as you have described?—I think that is the best suggestion I have heard, with a view to free the Bill at all from the absolute and necessary evils which must result from it unless there be some such provisions, but I do not think it will supersede the evil of the Bill.

Allow me to suggest to you that already the Pharmaceutical Society is in existence, and that it is empowered by charter to institute certain examinations. Suppose the Council of the Pharmaceutical Society should say, this Bill not being enacted into a law, and knowing that counter practice exists to a considerable extent, that they think they are justified in carrying their examination still further than they do now,

and in examining the candidates in medicine and surgery; what do you conceive would be the effect of such a practice?—I think at present we have the safeguard of the Apothecaries' Act. I think the decisions of the judges, to a great extent, after considerable difficulty, have settled the interpretation to be put upon that clause in the Act which refers to the dispensing of medicine and the practice of the chemist and druggist; but I think the moment this Bill is enacted, the judges of the land will have to reconsider the whole of that question. That is, that cases will come before them in this shape; that whereas, individuals have practised as pharmaceutical chemists, which the Society affirm to be the practice of pharmacy, because, in the preamble of this Bill we have pharmacy mentioned, and we have not only the words, "the practice of pharmacy," in the preamble of the Bill, but we have the words, "pharmaceutical chemist, and for other purposes connected with pharmacy."

Chairman.] You are referring now to the old Bill; will you look at the present Bill (*handing it to the Witness*)?—I am happy to see that so far the wording of the Bill is altered, but I do not think that the principle is altered. I believe the question will again arise, "What is carrying on the business of a pharmaceutical chemist," and the distinction to be drawn between that and the practice of medicine. It will rest wholly with the Pharmaceutical Society to determine whether a particular act is a practising of pharmacy; and if any difficulty arises it must still go before the courts, and the same question will have to be settled in reference to this Bill as that which has been already settled with reference to the Apothecaries' Act.

Mr. Wakley.] Do you not consider that this Bill would very much facilitate coming to a decision as to what was practising as an apothecary; and when the judge, on reading the ninth clause, would discover that every person may be registered under this Bill, except he be a qualified member of the medical profession; and if it were proved before him that a person had been practising medicine, from which it would follow that he could not register under this Bill, would it be *primâ facie* established before him that the party had in reality been practising illegally; and would it not be a guide and an aid to him in coming to his decision, which he does not now possess?—I think the effect would be otherwise. I would appeal to Mr. Wakley, to the cases which have been decided where individuals have been acquitted who acted as chemists and druggists, and the Apothecaries' Society have been unable to sustain the action against them; and the question here would be widened very much, because at present they are practising without any status or education whatever. Now here, it is true, the Act of Parliament will show to the judges of the land that the individual had no right to practise as a medical practitioner, but he will tell you that he is not so practising, but that he is practising as a pharmaceutical chemist. I mean to say the question will arise, "What is the distinction?"

Then the judge would have to add a definition to the one we have already got; but you will see this Bill is designed for the registration of chemists and druggists, and here is a provision absolutely excluding the medical practitioner from so registering himself?—I have not the least doubt of the distinction being drawn; I feel, and those with whom I act (for I am only an individual representing a body of gentlemen) feel that this Bill will not fail to draw the line of distinction as between the pharmaceutical chemist and the medical practitioner, but that it will establish for the pharmaceutical chemist the right of practising as such.

Mr. Ancell.] There is one point which I wish to mention; the Pharmaceutical Society under this Bill claims to be not only a licensing body, but an educating body.

Chairman.] At present the Society was obliged to establish a model school, because otherwise there were no means by which young men could educate themselves for an examination; but the Society has no desire to continue the school if there were any other means of education provided: the Society expends many hundreds of pounds annually to maintain their school, which they would be very glad to relinquish; they merely keep it up until the introduction of a law compelling young men to become educated has enabled a school to live on its own resources: would that remove your objection?—There is nothing in the Bill to prevent the continuance of the Pharmaceutical Society as both a licensing and an educating body, and if that be continued it gives them an immense power and an immense monopoly, which may be used to the greatest injury of the public.

Is there anything in the Bill which gives the society any authority to educate in any way?—The Society is already educating; there is nothing to prevent it.

Was there anything in the charter to give it anything of an educating character?—I am not aware that there was.

I may state to you as a fact, that there was not, and that the education of young men was merely a matter of necessity provisionally instituted for the purpose of carrying out a great object, which could not have been accomplished without it?—It has always been held, with reference to our medical institutions, that the examining body and the licensing body ought not to be the educating body. I believe that the history of the London University would show that the Legislature would not have permitted the two functions to be exercised by the same body.

TO CORRESPONDENTS.

W., Penzance.—1. Burnt amber is the residue which remains in the retort, when amber is subjected to distillation. 2. The price of Beasley's Receipt Book is 6*s*. 3. The recommendation of works on anatomy is not within our province.

An Apprentice, Boston.—Our correspondent is perfectly justified in suspecting anything recommended by the Society's organ; but nevertheless we advise him to qualify for the examination, whether he thinks proper or not afterwards to pass it. The books recommended are very good ones to study.

R. Boustead.—A solution of sulphuret of lime.

M. P. S.—Veterinary surgeons, being members of a medical corporation, are not permitted by the Pharmacy Act to remain or become members of the Pharmaceutical Society.

Tyro, Exeter.—1. Bicarbonates are more delicate tests for acids than carbonates, when effervescence is the criterion of their presence. No doubt the spirit of nitre contained an acid. 2. Fownes is most likely correct, although the difference is immaterial. 3. The laboratory of St. Bartholomew's Hospital is the better place to study at.

Mr. Martin, Broadstairs.—The process of Adolphe Martin is taken from the "Comptes rendus," and is no doubt correct. We do not think that you can follow a more simple process than the second one, by Bingham, in the last number of the "Annals," as we know that photographists have succeeded with it who were even unacquainted with chemistry.

W. D. T.—1. The large leaf specimen is common tobacco; the other is *Lobelia inflata*. It was a gross deception to pass the former off as *Lobelia inflata*, as it is derived from a plant belonging to a different natural order. 2. If the scammony effervesced with a dilute mineral acid, it must have contained an earthy carbonate, or chalk, and must therefore have been adulterated, though it had been sold as virgin scammony. 3. Thomson's "First Principles of Chemistry" is a work too much behind the present state of science to be suitable for a student.

M. P. S., London.—There must be something wrong in the proceedings of a society which requires the aid of a political journal for the purpose of keeping its head above water. No other public institution of a similar kind ever descends to puffing, or needs its aid to rise in public estimation. It is lamentable to reflect that a society, on which we had all built our hopes, should be reduced to such an undignified extremity by a few designing men.

G. O., Taunton.—The use of tartaric acid is a more scientific and direct method of preparing red ink, than employing cream of tartar, and we are sure an equally good one.

G. Cort, Winslow.—1. By rolling cartridge paper round rods of the requisite diameter. 2. In an oven heated to 300° Fahr. 3. Benzole. 4. No.

G. Field.—Bimeconate of morphia is nothing but the aqueous extract of opium, prepared from a cold infusion.

All communications for the Editors to be addressed to the care of the Publisher.

THE ANNALS OF PHARMACY

AND

PRACTICAL CHEMISTRY.

AN INTRODUCTION TO THE USE OF THE BLOWPIPE.

BY DR. THEODORE SCHEERER,

Professor of Chemistry to the Royal Saxon Mining Academy, at Freiberg.

No. II.

2.—*Platinum wire* of about $\frac{1}{100}$ of an inch thick. A long piece, as seen in Fig. 5, is bent into a ring, and at both of its projecting ends, hooks, or small rings, are formed. Through the ring, the operator puts the index finger of his left hand, and when the small ring or hook has been filled with the substance to be examined, he exposes it to the action of a blowpipe flame. Borax and phosphates (the chief of which will be spoken of hereafter) serve for filling this hook, as these salts, by being heated, melt into transparent globules, in which a fragment, or some of the powder of the substance to be examined, is introduced by the operator to observe its behaviour with these fluxes, both in the oxidation and in the reduction flame. It must be here remembered, that no substance should be subjected to any such test, which, under these conditions, has a destructive action on the platinum wire.

Fig. 4.

3.—*Platinum foil.*—For heating, and particularly melting, substances which are not to be exposed to a reducing action, as this action

is, with charcoal, unavoidable, the operator either lays the platinum foil (about two inches long and one inch broad) on a piece of charcoal, or holds it with pincers.

Fig. 5.

4.—A *platinum spoon*, of the size and form of the accompanying Fig. 5. When the spoon is used, its point is either stuck into a properly constructed handle, and fastened therein with a screw, or into a cork. Such a spoon is employed to melt certain substances with bisulphate of potash or nitre.

5.—*Pincers with Platinum Points.* Their construction is such (see Fig. 6), that both the platinum points, *a*, by pressure on both the buttons

Fig. 6.

b b, are brought together. Between the extreme ends of these points, the operator inserts a fragment or splinter of the substance which he will examine, either with reference to its fusibility, or its colour, when submitted to the heat of the (blue) blowpipe flame; the pincers should be between five and six inches long.

6.—*Glass tubes*, about $\frac{25}{1000}$ of an inch in diameter, and from five to six inches long. These are used particularly for roasting substances containing sulphur, arsenic, selenium, antimony, or tellurium, which, when heated by the operator, according to certain rules, in a tube, are recognized partly by the different kinds of deposits they leave on the walls of the tube, and partly by the odours evolved from them.

7.—*Small glass flasks*, which can be easily made by sealing one of the ends of glass tubes. These flasks should be from $2\frac{1}{2}$ to 3 inches long. They are employed to heat substances as much as possible in the absence of the air, when they contain volatile ingredients. The expelled volatile body then deposits itself on the walls of the flask, but not in an oxidized condition, as when heated in a glass tube.

D.—*The Blowpipe Reagents.*

In most blowpipe investigations, the operator can confine himself to the use of a very small number of reagents, and requires very limited quantities of them. There are only three reagents which are employed in a general way.

1. *Soda.*—Anhydrous carbonate of soda must be free from sulphuric acid, when applied to certain purposes. Soda serves chiefly for promoting the reduction of metallic oxides and metallic sulphurets on charcoal, for the analysis of silicates, and for the determination of the solubility or insolubility of a body, by its fusing together with the soda.

2. *Borax.*—Purified borax, deprived of the greatest part of its

water by heat, and then powdered. When used, the operator dips the redhot hook of the platinum wire into this powder, and melts that which adheres thereto by means of the blowpipe flame. This process he repeats again and again, until the hook is filled with a fused globule, which has, both hot and cold, a perfectly clear and colourless appearance. The powdered substance to be tested, is brought into contact with the yet hot and soft borax globule, in such a manner that an appropriate quantity of the powder may adhere to it, and in this way it is to be exposed to the action of the fused borax glass, before the blowpipe. The operator now observes the solubility or insolubility of the substance, and particularly the colour of the borax pearl, resulting from both the oxidation and reduction flames.

3. *Microcosmic Salts.*—The well-known double salt of phosphate of soda and phosphate of ammonia, as it cannot be well fused directly to the hook of the platinum wire, because so long as it evolves ammonia and water, it easily drops off, the operator fuses it first by a gradual heat, on charcoal, to a globule or pearl, and immerses in this the hook of the platinum wire. Its application is precisely the same as that of borax.

Besides these principal reagents, some others are employed in certain cases, namely, the following:—*Nitre*, for oxidizing fusion. *Bisulphate of potash*, for the expulsion and recognition of certain volatile bodies (lithia, boracic acid, nitric acid, fluoric acid, bromine, iodine), as well as for the decomposition of titanic, tantalic, and tungstic salts. *Nitrate of cobalt*, chemically pure and in solution, particularly for its reactions with alumina, magnesia, oxides of zinc and tin, and titanic acid, which, moistened and heated to redness with the cobalt solution, receive certain characteristic colours. *Silica*, for various purposes. *Fluor spar*, mixed with a certain quantity of bisulphate of potash, for the detection of lithia and boracic acid. *Oxide of nickel*, or *oxalate of nickel*, for the determination of large quantities of potash in salts, which, at the same time, contain soda and lithia. *Oxide of copper*, for detecting chlorine, bromine, and iodine. *Tin*, applied as tin-foil, for promoting the reduction of a substance dissolved in borax or microcosmic salt. The operator touches the still hot pearl found on the charcoal with the tin-foil, so that some of it remains on the pearl, and then blows a short time (some seconds) on it a strong as possible reducing flame. *Silver*, in the form of foil, for the detection of sulphur and sulphuric acid.

For the preservation of blowpipe reagents, well stoppered bottles are the best, which should be kept in a convenient wooden box. For travelling, an arrangement is necessary which shall prevent the glass stoppers from becoming loose, or getting out of the bottles.

E.—*Some other Instruments required for Blowpipe Investigations.*

The use of these instruments, some of which are more convenient than necessary, is evident when they are named. We here mention only the following,—a *hammer;* a small *anvil;* a *steel mortar*, as a pulverizing apparatus; an *agate mortar;* some *files* of different kinds; a *knife;* a pair of *scissors;* a *magnet;* a *lens*, &c.

II.

Quantitative Analysis with the Blowpipe.

This consists in the conduction of certain operations, and in the correct observation of the phenomena resulting therefrom, by which the presence or absence of certain bodies can be ascertained. Each examination is most conveniently taken in the following order with the substance to be tested. 1. In a glass flask or tube, one end of which is sealed. 2. In a glass tube, open at both ends. 3. On charcoal. 4. In the platinum pincers. 5. In the borax pearl. 6. In the microcosmic salt pearl; and 7, with soda. After proceeding with these tests, the operator has generally yet (8) some examinations to pursue, which have for their object the especial detection of certain substances, whose presence or absence could not be determined with complete certainty by the previously given tests.

1.—*Examination in a Glass Flask.*

A small quantity of the substance to be tested is placed in a clean and thoroughly dry glass flask, which is to be first heated gently at the lower end, at the best over an ordinary spirit lamp, then gradually stronger before the blowpipe, until the glass begins to soften. Hereby the operator observes—

(*a.*)—Whether anything sublimes or volatilizes; as, for example, water, quicksilver, sulphur, selenium, tellurium, arsenic. The first three named of these substances are readily recognized by their known properties. When an aqueous sublimate is obtained, the operator must not neglect to examine, by means of a strip of litmus paper, whether it has an acid or alkaline reaction. By the presence of organic matter, an empyreumatic fluid is formed. A small quantity of a deposit of *quicksilver* can often at once be recognized by means of a lens, as the use of a lens requires principally nothing besides care in all these examinations. *Selenium* sublimes with a red colour; when so much selenium is present that it is deposited in a thick layer, the red colour near the lower part of the flask passes over into a steel-grey colour. *Tellurium* produces a grey, and *arsenic** a black sublimate, which latter exhibits, when the quantity of arsenic is considerable, a metallic lustre. The operator cannot positively conclude, by the non-appearance of these reactions, that these substances are entirely absent. For example, sulphur, selenium, tellurium, and arsenic, can exist in combinations from which, by heat, they are expelled either not at all, or in a non-metallic condition. Further, it must be observed, that two or more of these substances may be contained at the same time in a compound, and be thereby together expelled and sublimed, and, in consequence, their recognition is rendered more or less difficult. This is very frequently the case with sulphur and arsenic. These give sometimes a sublimate which, at its lower part, consists of bright metallic arsenic; but further above, in portions succeeding one another, exhibits a black, brown, red, and yellow colour. These colours originate

* Metallic arsenic.——*Editors of "Annals."*

from *sulphuret of arsenic*, which volatilizes sooner than metallic arsenic. *Oxygen* and *ammonia*, when they are evolved by heating a substance, are recognized, in all cases, by these tests; the former, by the introduction of a lighted wooden match into the tube, or flask,—and the latter, by the introduction of moistened reddened litmus paper. Generally, ammonia is not evolved in a free condition, but in combination with an acid, in which case, the operator obtains a white sublimate of an ammoniacal salt. By mixing the suspected substance with lime or soda, and exposing the mixture to heat in a glass flask, the ammonia becomes free and can be thereby recognized as such. There are, besides, some other bodies, in particular, *fluorine*, *chlorine*, *bromine*, *iodine*, and *nitric acid*, which can be detected by examination in the glass flask. However, as this detection, in most instances, is not effected by heating the substance concerned alone, but by means of the cotemporaneous application of certain reagents, the principles thereof are explained in the 8th Section (Method of conducting some examinations, which have for their aim the special detection of certain substances).

(*b.*)—Whether the heated body in any way changes; for example, its *colour disappears*, and perhaps, by cooling, returns again; its *form* or *its aggregate condition alters;* it *becomes heated;* it is rendered *phosphorescent, or decrepitates, &c. &c.* To go through all such cases here, would lead to great prolixity, and not even then make superfluous an exact chemical knowledge and experience, which every experimentor with the blowpipe must necessarily find to be a great assistance in understanding these pages.

The examination in the glass flask gives, in many cases, as may be seen from what has been previously shown, no certain, definite means of recognition; but oftentimes merely indications of the presence of substances, which can only be detected with complete certainty by a more extended process of examination. But these indications are of importance, and elucidate further researches.

2.—*Examination in an open Glass Tube.*

The substance to be examined is introduced, in a state of powder, about half an inch into the tube, which is heated gradually at the place where the powder lies. The operator holds the tube inclined, so that the hot stream of air passes in over the substance, and escapes outwards at the upper and longer part of the tube. In this way, a roasting (an oxidation heating) is produced, by which different bodies become volatilized and recognized. *Sulphur* is evolved as sulphurous acid, and gives, as such, the well-known penetrating odour by which it is easily recognized. *Selenium* hereby completely resists oxidation, but deposits itself as a sublimate, between a red and steel-grey colour (see Section 1), in the glass tube above the heated part. At the same time, the very characteristic odour of selenium vapour presents itself, resembling putrid radishes, an easy and certain means of detection. *Arsenic* is volatilized as arsenious acid; *antimony*, as oxide of antimony acid; and *tellurium*, as telluric acid; all three of which are deposited as white sublimates. The arsenious is very evidently crystalline, while the other two appear

in the form of powders. Arsenious acid and oxide of antimony can be driven by heat from the place where they have sublimed. With telluric acid this only appears to take place; it fuses into a small drop, clear as water, which sometimes can be recognized by the naked eye, but most surely by means of a lens. The roasting must proceed slowly by a gradually increasing temperature, and a good draught of air must pass through the tube, which is effected by inclining it, because roasting will also sublime unoxidized bodies, and besides, the roasted substance easily conglomerates. When the operator desires to roast a substance as much as possible, it must, after it has been treated some minutes in the tube, be thrown into an agate mortar, triturated, and then again roasted. This alternate roasting and trituration should be continued as long as any volatile substance is evolved.

3.—*Examination on Charcoal.*

By heating the substance to be examined on charcoal, the operator takes precisely similar observations as by its treatment in the glass flask. It is of very great importance to be able to learn the colour and certain other properties of the deposit which some bodies leave, by being thus heated on charcoal. The following arrangement, borrowed from Plattner's "Probirkunst mit dem Löthrohre," shows the principal of these properties.

Selenium fuses very readily, and gives in the oxidizing and reducing flames a brown vapour, and at a little distance from the test, a steel grey, slightly metallic, bright deposit; and at a greater distance, a slight dark grey, passing somewhat into violet, deposit; this deposit may be driven from one place to another by the oxidizing flame, and when blown upon by the reducing flame, it leaves its place with fine azure blue appearance. While selenium fuses on charcoal, or when a deposit formed thereby is acted upon by the blowpipe flame, a strong odour of putrid radishes is to be perceived, which is due to its gaseous and colourless evolved oxide.

Tellurium fuses very easily, volatilizes as a vapour, and deposits on the charcoal, by the oxidizing and reducing flames, at a small distance from the tested substance, telluric acid; the deposit is white, but has a red or dark yellow border. It may be driven by an oxidizing flame from one place to another; and when blown upon by the reducing flame, it is dissipated with a green, and when silicium is present, with a bluish-green appearance.

Arsenic volatilizes without first fusing, and deposits on the charcoal, by the oxidizing and reducing flames, arsenious acid. The deposit is white, in thin layers, greyish, and is found at some distance from the tested body. It may be driven off again by the heat of the blowpipe flame. When the operator blows quickly upon it, with the reducing flame, it is dissipated with a slight clear blue appearance. By its volatilization a strong odour of garlic is to be perceived, which is due to the suboxide of arsenic evolved.

Antimony fuses very easily, and deposits its oxide on the charcoal by the oxidizing and reducing flames. The deposit is white, in thin layers, bluish, and is found at a less distance from the test than the deposit of

arsenious acid. By a gentle heat, it may be driven from one place to another by the oxidizing flame, without giving a coloured appearance; but when the operator subjects it to the reducing flame, it changes its position, with a feeble greenish-blue appearance. As the antimonial deposit is not so volatile as the arsenical one, each deposit may be easily distinguished from the other.

When metallic antimony is fused on charcoal and exposed to a red heat, and the blowing then stopped, and the charcoal, with the fluid metallic globule, carefully laid down, the latter remains for a long time in a glowing fluid state, and evolves in consequence a dense white vapour, which is partly deposited on the charcoal, and at last around the globule in white, pearly, shiny crystals. This phenomenon depends upon these facts:—The fluid metallic globule heated to redness absorbs oxygen from the atmosphere, forms oxide of antimony, and, in consequence, so much heat becomes free as is necessary to retain the easily fusible antimony a long time in a redhot state of fusion, and, indeed, as long as the antimony is not covered with crystals of the oxide.

ON A NEW CRYSTALLINE BODY FROM HELLEBORUS NIGER.

BY WILLIAM BASTICK.

(Read before the Pharmaceutical Society.)

THE natural order *Ranunculaceæ* contains a number of plants of great activity on the animal economy, and most of these employed as medicinal agents have been thoroughly examined by chemists, by whom their active principles have been separated beyond doubt. It has been found, as is well known, that these active principles are organic bases of extreme virulence, and possess the properties of the plants from which they are derived in a highly concentrated form. Black hellebore root has been several times examined for the purpose of ascertaining what were its active constituents, and more especially to learn whether, like other members of this family, it contained an organic base. Vauquelin ascribed its activity to the presence of an acrid oil, and Gmelin to a soft resin which exists in it. The most recent and complete examination of black hellebore root is that of M.M. Feneulle and Capron*, whose researches were principally directed to prove the absence or presence of an alkaloid in this root. However, they came to the conclusion that no such body existed in it, and that its activity was due to a combination of a fatty oil with a volatile acid, which they separated from it. Doubting the truth of their conclusions, and reasoning from analogy, I was led to believe that, by the improved methods of research of the present day, an organic base might be extracted from it. I therefore adopted a method which experience has shown will eliminate an alkaloid from any substance, if any such alkaloid, soluble in ether, exist therein, and which is as follows:—

The black hellebore root was finely bruised, and macerated with alco-

* "Journal de Pharmacie," Vol. 7, page 503.

hol, containing $\frac{1}{50}$ part of strong sulphuric acid. After three days, the tincture was filtered from the root, and supersaturated with calcined magnesia. The liquid was then filtered, and sufficient sulphuric acid added to it to render it slightly acid. It was again filtered, to remove the sulphate of magnesia formed. The filtrate was now mixed with twice its volume of distilled water, and the mixture evaporated, to expel the alcohol, and to reduce considerably the bulk of the solution. To remove the soft resin, which was separated by replacing the alcoholic menstruum with water, filtration was resorted to. The concentrated fluid was then carefully saturated with carbonate of potash, but nothing was precipitated. A large excess of that carbonate was now added, and the solution agitated for some time with four times its volume of ether, and afterwards set aside, so that the ethereal part of the liquid might separate from the watery portion. When this separation had taken place, the ethereal portion was removed from the bottle by means of a pipette, and exposed to spontaneous evaporation in a capsule. Had an organic base been present in the root, it would have been found in the ethereal solution; but this solution was entirely free from any reaction on litmus paper. Thus far my experiments corroborate those of M.M. Feneulle and Capron, as to the non-existence in black hellebore root of any body having the more distinct characteristics of an alkaloid, but no further; for I found in the ethereal solution, by its evaporation, a well-defined *crystalline* organic body, to which I propose giving the name of *helleborine;* although that name has been already given to the soft resin by Gmelin, and undeservedly so, as I think, because it possesses no peculiarities, either physical or chemical.

This new body readily separates, by evaporation, from its watery alcoholic and ethereal solutions, in white translucent crystals. It is slightly soluble in water, more soluble in ether, and readily soluble in alcohol. It dissolves more freely in these liquids when they are heated. It is bitter to the taste, and produces on the tongue a tingling sensation, like the root. Strong sulphuric acid decomposes it, and gives with it a reddish-brown solution, which, when diluted with water, affords a brown precipitate. Concentrated nitric acid dissolves it; but does not oxidize it until the solution has been exposed to heat. After it had been thus oxidized, the usual tests showed that oxalic acid was not one of the products. This substance is not volatile, and when heated, is decomposed and leaves a carbonaceous residuum, but does not inflame. It is, as previously indicated, entirely without reaction on litmus paper, and does not combine with or saturate acids or alkalies. A dilute solution of caustic potash appears to produce no change in it, as is also the case with dilute mineral acids. It is not precipitated from its solutions by acetate of lead, bichloride of mercury, or iodide of potassium. When heated in a dry state with fused caustic potash in a tube, ammonia is evolved, which shows that it is a nitrogenous body. It therefore closely resembles piperine in many of its properties, which is classed amongst the alkaloids, although, like helleborine, it is devoid of alkaline reaction; but whether it possesses an elementary constitution similar to that of piperine, or the alkaloids in general, remains to be determined by ultimate analysis.

Having so far endeavoured to learn its characters, I proceeded to ascertain if this new body could not be extracted from black hellebore root by a more simple process. I treated the bruised root with alcohol, to form a strong tincture. The filtered tincture was diluted with water, and heated for some time, to expel the alcohol. The aqueous solution was then filtered, to remove the separated resin, and afterwards further evaporated, when some helleborine crystallized out of the solution; but in a less pure condition than by the former process. Consequently, I treated the solution with carbonate of potash in excess, and agitated it with three or four times its volume of ether, which extracted the helleborine almost in a state of purity. This substance may be further purified by solution in alcohol, and recrystallization.

It is probable, from this latter process, that helleborine exists in an uncombined state in the root, and that it is the soft resin contained therein which chiefly interferes with its extraction and recognition by a simple solvent as a crystalline substance. There is also a free acid in black hellebore root, which it is necessary to neutralize with a base before the helleborine is extracted from its aqueous solution with ether, as it contaminates the product. This is not gallic acid, which is said to exist in this root, according to the analysis of M.M. Feneulle and Capron, as it did not give a black precipitate with a persalt of iron, but a brown gelatinous one; it also afforded white precipitates with acetate of lead, and with nitrate of silver. Neither is it the volatile acid found by them, as it is not expelled from its solutions by long boiling. It seems to resemble closely the aconitic acid found in another member of the natural order *Ranunculaceæ*, especially when it is remembered that, like that acid, it is soluble when free in alcohol, ether, and water.

It may be mentioned that, in consequence of the insolubility in ether of the colouring matter extracted by alcohol from black hellebore root, it is scarcely necessary to use animal charcoal to decolorize the helleborine, as its ethereal solution is colourless in the above process, and this substance crystallizes thereout, with care, nearly in the same condition.

FACTS AND DISCOVERIES IN SCIENCE.

Iodine in Plants.—M. A. Chatin has arrived at the following conclusions from an extensive series of experiments on this subject:—

1. That the proportion of iodine present in plants is generally independent of their nature, but closely connected with the localities in which they are to be found growing. Thus, the *Confervæ*, the *Nymphæa*, the *Ranunculi*, the *Potamogetons*, and the varieties of cresses, contain much more iodine in running streams, than when they are growing in marshy places.

2. That the iodine is present in the juice or sap of the plants as an alkaline iodide, and altogether uncombined with the tissue of which the plant is composed.

3. That iodine is not universally present in terrestrial plants, but that it exists, in more or less abundance, in all aquatic plants.

4. That in aquatic plants, those that are growing in stagnant waters are found to contain far less iodine than those that are growing in running streams.

5. That in such collections of water as are large enough to be strongly moved by the action of the winds, the plants growing therein contain much more iodine than those growing in waters at all times stagnant, and not agitated on their surface.

Chlorinated Merino; a Test for ascertaining the Presence of Sugar in Liquids.—Strips of white merino, after being soaked three or four minutes in an aqueous solution of bichloride of tin, made with 100 parts of the bichloride of tin and 200 parts of water, and subsequently carefully dried, are convenient as a test for this purpose. By employing this chlorinated merino, the physician is able, without the least trouble, to ascertain whether the urine, or other fluid, contains any trace whatever of sugar in it. All that is required is to drop a very little of the urine, or fluid to be tested, on a strip of the chlorinated merino, and to hold it over the flame of a spirit-lamp, when, if any sugar be present, a very distinct black spot will be produced.

M. Maumene, to whom we are indebted for this reagent, says that it is a most delicate test. Ten or a dozen drops of diabetic urine, containing sugar, mixed with a large quantity of water, will produce a dark brown stain, on the introduction of a strip of this prepared test; whereas healthy urine, urea, and lithic acid, are not thus discoloured by the addition of chloride of tin.

Preparation of Atropia by means of Chloroform.—M. Rabourdin recommends the following process for the preparation of atropia, the active principle of the *Atropa belladonna*:—

Take fresh belladonna, as soon as it begins to flower, bruise it in a marble mortar, and press out the juice, which is to be heated so as to coagulate the albumen. When the juice thus clarified is cold, add to every litre four grammes of caustic potash, and thirty grammes of chloroform; the mixture is then to be shaken for a minute or two, and suffered to stand. In half an hour, the chloroform, holding the atropia, is deposited, having the appearance of a greenish oil. The supernatant liquor is then to be poured off, and replaced by a little water. This is afterwards poured off, and the washing is to be continued till the water comes away quite clear. The chloroform solution is then to be put into a small tubulated retort, and distilled in a water-bath, until all the chloroform has passed into the receiver. The residue in the retort is to be heated with a little water, acidified with sulphuric acid, which dissolves the atropia, and leaves a green resinoid matter; the filtered solution is colourless. To obtain the atropia in a pure state, it is only requisite to pour into the acid solution a slight excess of solution of carbonate of potash, and to dissolve the precipitate in rectified alcohol. This solution yields, by spontaneous evaporation, fine groups of acicular crystals of atropia. M. Rabourdin supposes, that this mode of operating with the *Atropa belladonna* may be applied to many other substances containing vegetable alkalies, as the cinchonas and other plants.

Nitro-mercurial Test for Albumen and other Protein Compounds.—The nitro-mercurial solution of M. Millon is prepared by adding to the

metal mercury, an equal weight of nitric acid, containing four and a half equivalents of water. This mixture is to be gently heated until the metal is completely dissolved, when two volumes of water are to be added to one volume of the nitro-mercurial solution. After standing some time, the clear liquid is to be poured off. This acid solution of mercury, M. Millon says, is a very delicate test for all albuminoid substances, as well as for many secondary products connected with it. It imparts a deep red colour to such substances, and by its application as a reagent, the ten-thousandth part, or even less, of albumen may be detected. He affirms that cotton, various kinds of starch, and gum-arabic, assume a very distinct rose tint when brought into contact with it. The urine is almost immediately rendered of a rose-red colour. The albumen of the blood, and of vegetables, fibrine, casein, gluten, legumin, silk, wool, feathers, horn, the epidermis, gelatine, chondrine, protein, the corner of the eye, &c., are all rendered more or less red by the application of this test.

Ballota Lanata.—This plant has been highly extolled by Professor Brera as a diuretic. It is indigenous in that part of Siberia adjoining China. It is collected at the time of flowering, and brought by the Russians to market in bales covered with fur. The whole of the plant is useful in medicine. It has a smell very much resembling that of tea, whilst its taste is slightly pungent and bitter. The infusion of the plant is a pale greenish-yellow. The tincture made with weak spirit contains all the active properties of the plant. Decoction is said to be the most efficient form in which this medicine can be administered. This preparation is directed to be made by boiling in an unglazed vessel, for a quarter of an hour, half an ounce of the plant, in as much water as, when strained, shall amount to eight fluid ounces; and this quantity is considered as four doses, which may be taken during twenty-four hours.

To show the very high opinion Professor Brera entertains of this drug, he remarks, that "the *Ballota lanata* is the most efficacious plant to supply the blood with what is required to relieve it from all morbid supersaturation, and to prevent its reproduction."

Cimicifuga Racemosa.—This plant is known in many parts of America as the Black Snake Root; and although long known and used as a domestic remedy in trifling ailments, it has lately been submitted to the professional notice of physicians by Dr. Young, of Pennsylvania, as a most useful remedy in some varieties of nervous diseases. It is administered in the form of powder, or decoction and infusion of the root of this plant.

Caïnca.—The diuretic properties of this plant have been long known in the Brazils, and some other parts of South America; but it was first made known to European practitioners by one of the Russian consuls, stationed at Rio Janeiro. It is the *Chiococca racemosa*, in the Linnæan and of the family *Rubiacæ*, in the Jussieuan systems of botany. The root of the plant consists in great part of a delicate cortical portion, enclosing a woody centre; but it is in the cortical portion only that the medicinal properties of the plant reside. This has a slightly bitter, pungent, and astringent taste, and breaks with a resinous fracture. The root, or rather the cortical part of it, possesses remarkable tonic

properties, whilst it is, at the same time, slightly purgative, and powerfully diuretic. It is usually administered in the form of decoction, prepared by boiling a drachm of the root in a pint of water, which may be taken in the course of twenty-four hours.

Seeds of Phellandrium Aquaticum.—Dr. Recamier, of Paris, recently deceased, physician to his late Majesty, Louis Philippe, and other medical authorities, have recommended and employed these seeds extensively in various kinds of pulmonary affections, particularly in that form of chronic bronchitis which so frequently attacks the aged in cold, damp weather, and which causes them so much annoyance, and sometimes so much suffering, until the weather undergoes a change. These seeds may be administered twice a day, either in the state of powder, or in the form of syrup, of which latter from two to four spoonfuls may be taken during the day, and continued for some few weeks, until relief is obtained. The powder is usually given to the patient mixed with a little sugar.

C.

SOME GENERAL CHEMICO-PHYSICAL RELATIONS OF ORGANIC COMPOUNDS.

BY DR. CHARLES LÖWIG.

No. I.

Under metameric compounds are understood those consisting of the same elements, whose relative and absolute number of atoms is equal, but whose different properties are dependent upon the difference of their principal constituents. Now, because the radicals of the formyl group contain two atoms more carbon than the corresponding members of the methyl group, and the former form acids with three atoms of oxygen, whilst the latter form basic oxides with one atom of oxygen, it follows, that by cross combination of the acids of the formyl series with the oxides of the methyl radicals, metameric compounds must result, the number of which may be still increased with the corresponding hydrated acids. The following are metameric:—

Formiate of methyl oxide, . .	$C_2 H_3, O + C_2 H, O_3 = C_4 H_4 O_4$.
Hydrate of acetic acid, . . .	$H O + C_4 H_3, O_3 = C_4 H_4 O_4$.
Acetate of methyl oxide, . .	$C_2 H_3, O + C_4 H_3, O_3 = C_6 H_6 O_4$.
Formiate of ethyl oxide, . .	$C_4 H_5, O + C_2 H, O_3 = C_6 H_6 O_4$.
Hydrate of metacetylic acid, .	$H O + C_6 H_5, O_3 = C_6 H_6 O_4$.
Metacetylate of methyl oxide,	$C_2 H_3, O + C_6 H_5, O_3 = C_8 H_8 O_4$.
Acetate of ethyl oxide, . . .	$C_4 H_5, O + C_4 H_3, O_3 = C_8 H_8 O_4$.
Formiate of buthyl oxide, . .	$C_6 H_7, O + C_2 H, O_3 = C_8 H_8 O_4$.
Hydrate of butyric acid, . .	$H O + C_8 H_7, O_3 = C_8 H_8 O_4$.

As I have previously remarked, when speaking of the formation of organic compounds, that in general hydrogen promotes the volatility of compounds, whilst carbon prevents it; compounds in which hydrogen predominates are either gaseous by ordinary temperatures, or they boil by low ones; whilst compounds which are rich in carbon are slightly or not at all volatile. But even as the properties of compounds

of higher order are determined chiefly through their principal constituents, and not by their remote elements, so must also (in the determination of their boiling points) the influence which their components have be distinguished from that of the elements of the individual components. Thus, for example, the boiling point of acetyl, $C_2 H_2$, $C_2 H$, depends, first, on the influence of $C_2 H_2$ on $C_2 H$; and, secondly, on the influence which C_2 exercises on H_2 in $C_2 H_2$, and C_2 on H in $C_2 H$. In the same manner, the boiling point of methyl ($C_2 H_2$, H) is dependent upon the influence of $C_2 H_2$ on H, and of C_2 on H_2 in $C_2 H_2$. When radicals combine with oxygen, their equivalent relations are also to be thus considered, as well as compounds of a higher order.

The hydrate of metacetylic acid, H O ($2\ C_2 H_2$, C_2 H) O_3, boils at 284° Fahr., and the hydrate of benzoic acid, H O ($2\ C_2 H_2$, C_8, C_2 H) O_3, at 464°; therefore, by the introduction of the nucleus C_8, the boiling point of the latter body is raised 180° above the former. Cinnamic acid, H O $2\ C_2$ H ($2\ C_2 H_2$, C_8, C_2 H) O_3, boils at 572°. By the addition of the conjugate $2\ C_2$ H, its boiling point is raised 108° above that of benzoic acid. An equal difference is exhibited between benzine, ($2\ C_2 H_2$, C_8, H) H, and cinnamine, $2\ C_2$ H ($2\ C_2 H_2 H_8$ H) H. When the boiling point is reckoned from the whole number of elements, in such a way that one is considered as an elevator and the other as a depressor in the calculation, then a result is often obtained which for one class of compounds is correct, but which for others cannot be maintained. Compounds which belong to one and the same group exhibit in their boiling points precise regularity; for in the proportion in which each member rises in the series, so is its boiling point elevated an equal number of degrees. This elevation amounts for $C_2 H_2$ to between 30° and 36°; consequently, when the boiling point of the first member is known, all the following ones can be approximately reckoned. Thus boils

		Found.
Woodspirit, ...	$C_2 H_4 O_2$	at 141° Fahrenheit.
Alcohol, ...	$C_4 H_6 O_2$	„ 172° „
Fusel oil, ...	$C_{10} H_{12} O_2$	„ 271° „
Formic acid, ...	$C_2 H_2 O_4$	„ 217° „
Acetic acid, ...	$C_4 H_4 O_4$	„ 242° „
Butyric acid, ...	$C_8 H_8 O_4$	„ 309° „
Valerianic acid, . . .	$C_{10} H_{10} O_4$	„ 341° „
Benzine, ...	$C_{12} H_6$	„ 176° „
Toluine, ...	$C_{14} H_8$	„ 226° „
Cumine, ...	$C_{18} H_{12}$	„ 273° „

There exist, however, also large variations from this rule; but they are probably dependent on the rational formulæ of the compounds.

The boiling point of the hydrate of ethyl oxide (alcohol) lies at 172°, and that of ethyl oxide at 95°; consequently, the hydrate water elevates the boiling point about 77°. If we assume in general that the boiling point of an organic hydrate is about 77° higher than that of its anhydrous oxide, then the boiling point of anhydrous formic acid is 217° — 77° = 140°, and that of the following member of the series 32° higher, that of the second 64°, and that of the third 96°.

The boiling point of the acetate of ethyl oxide lies at 165°, which is therefore about 79° lower than that of hydrated acetic acid, and about

70° higher than the boiling point of the ethyl oxide. As only by the addition of $C_2 H_2$ is the boiling point raised 32°, then that of formiate of ethyl oxide must be 165° − 32° = 133°. The same boiling point must acetate of methyl oxide have, which agrees with actual observation. It appears in general that metameric compounds of homogeneous composition have the same boiling points; so that the boiling point of a hydrated acid lies about 77° higher than that of its corresponding ethyl compound, and about 110° higher than the boiling point of the corresponding methyl compound.

By oxidation the boiling point of a compound is frequently very considerably elevated; for example:—

Aldehyde, . .	H O $(C_4 H_3)$ O	boils at	70°	Difference for O_2 173°.
Acetic acid, . .	H O $(C_4 H_3)$ O_3	„	243°	
Chloral, . . .	H O $(C_4 Cl_3)$ O	„	201°	„ „ O_2 182°.
Chloracetic acid,	H O $(C_4 Cl_3)$ O_3	„	383°	
Butyral, . . .	H O $(C_8 H_7)$ O	„	203°	„ „ O_2 106°.
Butyric acid, .	H O $(C_8 H_7)$ O_3	„	309°	
Valeral, . . .	H O $(C_{10} H_9)$ O	„	230°	„ „ O_2 117°.
Valerianic acid, .	H O $(C_{10} H_9)$ O_3	„	347°	

The chlorine compounds of the primary radicals have, as a rule, a lower, and the bromine and iodine compounds a higher boiling point, than the corresponding oxides; for example:—

Ethyl oxide, . .	$(C_4 H_5)$ O	boils at	95°.
Chlorethyl, . .	$(C_4 H_5)$ Cl	„	52°.
Bromethyl, . .	$(C_4 H_5)$ Br	„	104°.
Iodethyl, . . .	$(C_4 H_5)$ I	„	158°.

On the contrary, when a primary radical is converted into a derived one, an elevation of its boiling point takes place; for example:—

Aldehyde, ...	H O $(C_4 H_3)$ O	boils at	70°	Difference 131°.
Chloral, ...	H O $(C_4 Cl_3)$ O	„	201°	
Acetic acid, ...	H O $(C_4 H_3)$ O_3	„	243°	„ 140°.
Chloracetic acid, ...	H O $(C_4 Cl_3)$ O_3	„	383°	
Acetyl chloride, ...	$(C_4 H_3)$ Cl_3	„	167°	„ 216°.
Chloracetyl chloride . . .	$(C_4 Cl_3)$ Cl_3	„	383°	
Formiate of ethyl oxide, . .	$(C_4 H)$ O, $(C_2 H)$ O_3		131°	„ 74°.
Chlorformiate of ethyl oxide,	$(C_4 H_5)$ O, $(C_2 Cl)$ O_3		205°	

These examples may be sufficient to show that regularity exists. There is reason to believe that, when still more correct observations are made known, the differences of boiling points can be used to determine the rational composition of bodies. Then it will be also possible to fix the influence which the individual component of a compound exercises on its boiling point.

ON A NEW COBALT COLOUR.

BY M. ST. EVIE,

Lecturer at the Faculty of Sciences, Besançon.

When a cold concentrated solution of nitrite of potash is added to a cold concentrated solution of nitrate of cobalt, a disengagement of

binoxide of nitrogen takes place, accompanied by the deposition of an insoluble precipitate, of a peculiar yellow colour. A considerable quantity of nitrate of potash is found in the supernatant liquor.

This new substance may also be produced by the following method:—To the blue subsalt of cobalt, obtained as a precipitate by the addition of potash to a solution of nitrate of cobalt, add a slight excess of nitrite of potash, and allow a small stream of nitric acid to flow in by means of a pipette; in this case, also, a disengagement of binoxide of nitrogen ensues, with the formation of nitre, and the production of a yellow precipitate.

The other method is, first, to add potash in slight excess to a solution of nitrate of cobalt until the rose-coloured protoxide of cobalt appears, and then to pass through the resulting magma a current of binoxide of nitrogen.

The following are some of the characteristics and properties of this new body:—It is of a light yellow colour, answering to the yellow in the chromatic arrangement of M. Chevreul. Its form is that of four-sided prisms terminated by triangular facets; it is insoluble in water, alcohol, and ether; partially soluble in sulphuret of carbon; neutral to litmus paper. Boiling water decomposes it out of contact of the air, with disengagement of binoxide of nitrogen; in contact of the air, vapours of nitric acid are formed, at the same time the solution becomes alkaline and acquires a rose colour, and the ordinary nitrate of cobalt and nitrate of potash are found in it. Suspended in water, it resists for a long time the action of a current of chlorine, and it is only in heating the mixture that decomposition takes place. Under the same circumstances, it resists equally well the action of sulphuretted hydrogen, but hydrosulphuret of ammonia almost immediately causes the formation of black sulphuret of cobalt. The action of acids on this substance gives rise to a disengagement of suffocating vapours. Calcined in a sealed tube, it changes its tint, which passes to an orange-yellow. At the same time it becomes fused, and water is disengaged together with the red fumes of hyponitic acid, and the white vapours of nitric acid. The residuum obtained is composed of sesquioxide of cobalt and nitrate of potash.

By operating in a current of nitrogen or dry carbonic acid, there are obtained in addition all the products of binoxide of nitrogen.

Lastly, under the same circumstances, but employing the elevated temperature of a bright charcoal fire to effect the decomposition of this substance, there is obtained, after the removal of carbonic acid by means of potash, and binoxide of nitrogen by sulphate of protoxide of iron, a gaseous residuum, presenting the characteristics of nitrogen.

Analysis gave the following formula for the constitution of this new colour, $Az_2\ O_8$, Cb O, K O, $\frac{1}{2}$ H O.

It is therefore necessary, as well on account of the presence of water, as the formation of sesquioxide of cobalt by calcination, to double the above formula, which thus becomes 2 (Az_2, O_8, Cb O, K O) H O in equivalents.

En résumé, it thus appears that this salt must be considered as a combination of nitric and nitrous acids united to potash, water, and

protoxide of cobalt. This is, at least, the most simple description of it, resulting from an examination of its mode of production, &c.

On account of the great beauty of its colour, and its capability of resisting the ordinary agents of oxidation and sulphuration, M. St. Evie is of opinion that this colour may be successfully employed in painting. Experiments which have been made on this point during the last twelve months, the particulars of which are in the hands of M. Chevreul, tend to show that it may be employed, without undergoing any change, both in oil and water painting. Several artists have used it, and it is very probable that this colour will prove an addition to the fine arts.

ON THE ELECTRO-CHEMICAL PROPERTIES OF HYDROGEN.

BY M. E. BECQUEREL.

THE following are the conclusions arrived at by M. Becquerel from his investigations on this subject:—

First.—A platinum wire, which alone is not able to reduce a neutral solution of chloride of gold, acquires this property when the solution is placed in contact with hydrogen gas, and the wire placed partly in the gas and partly in the solution; the gold is precipitated in a metallic state on the portion of platinum wire dipped in the liquid, and the gas is absorbed as fast as the deposit is effected.

Secondly.—This action takes place equally well in closed tubes and removed from the action of atmospheric air. As the liquid, after the reaction, does not contain platinum in solution, it follows that that metal does not undergo any alteration, but that it serves only as a conductor, and acts only by its presence.

Thirdly.—A gold wire or plate, under the same conditions, produces no appreciable effects.

Fourthly.—A voltaic couple may be formed with only one liquid, (the solution above mentioned), two strips of platinum and one gas (hydrogen), the latter being in contact with one of the strips of platinum and with the solution. By uniting several couples together, a gas battery is obtained, composed of one gas only, a metal, and a liquid. Up to the present time it has been considered that with platinum and acidulated water, two gases, hydrogen and oxygen, were necessary for obtaining this result. The elements of the battery formed with chloride of gold possess a less intense action than the others.

Fifthly.—The solution of chloride of gold, chemically pure, may be considered as definitively replacing the acidulated water and oxygen, in the gas battery.

The remarable effects manifested in this case must not be confounded with those to which certain gaseous solutions or liquids, such as nitric acid, give rise to, absorbing hydrogen at the ordinary temperature and without the intervention of platinum,

M. Becquerel states that the experiments hitherto made with other solutions, have not given results so clear and definite as that of the chloride of gold.

FUTURE PHARMACEUTISTS.

The general excitement induced by the registration of chemists under the Pharmacy Act, and the importance attached thereto by implication, must not let us forget that some little consideration is due to the rising generation of pharmaceutical chemists. We are induced at this juncture to offer a few words of advice and encouragement to those who form that class, from two circumstances, viz.,—a number of gentlemen about to commence business as principals, have at various times applied to us for information, and sought our opinion upon certain points connected with their future career, from miscomprehensions occurring from the oracular character of the proceedings of the Pharmaceutical Society, and the intimidation naturally arising from an ambiguous and a studiously misrepresented Pharmacy Act; and also, from having recently seen, in a contemporary periodical, an article headed "To parents and guardians," which certainly must either be the offspring of a distempered brain, or have emanated from that celebrated nonentity, Mrs. Harris. However, it were futile for us to speculate further as to its origin, nor do we feel called upon to indicate precisely what ancient female was the author of such an effusion; suffice it for our purpose that we at once proceed, for the benefit of such of our readers as have not had the felicity of perusing that precious production, to give a brief extract, which, in some measure, will serve as a type of the whole tirade.

"Supposing the selection to be made, the classical examination passed, and the terms of apprenticeship agreed upon—the premium is paid, and for this consideration the master undertakes to instruct his pupil in the art and mystery of the business of a Pharmaceutical Chemist. His parents probably think they have now done their duty, paid his fare, and started him in the train, his master being responsible for the rest. This is a very common delusion. In the shop he will learn to fold parcels, fill bottles, make pills and horse-balls, and serve customers. He may get a smattering of Chemistry, and a certain amount of mechanical dexterity in manipulation. At the close of his apprenticeship it will be advisable for him to take a situation for two or three years, for the purpose of obtaining more experience in the business before commencing on his own account. We may suppose him to be on his round, provided with introductions to some of the London Chemists, inquiring for a vacancy. He meets with a very eligible situation, and is subjected to a few preliminary inquiries. First, 'Are you an Associate of the Pharmaceutical Society?' 'No.' 'Have you not passed the examination?' 'No.' This may possibly close the conversation; but in case another chance should be given, a prescription is placed in his hand, with the questions, 'What is the chemical composition of the first ingredient?' 'How does the Pharmacopœia order it to be prepared?' 'What decomposition takes place when these ingredients are mixed?' 'What is the usual dose of this tincture, and how much

would be a poisonous dose?' He is taken by surprise—he was not prepared for questions of that kind. A few drugs and medicinal plants are shown him, and he is desired to state their names, general character, and mode of preparation. He is equally at fault, and instead of putting on his apron he resumes his hat. This may occur several times in the course of his round, until he discovers that the payment of an apprentice-fee does not insure a qualification for his business, and that something more is requisite than the manual dexterity which he has acquired behind the counter. If he had known beforehand what he had to expect, he might have applied himself to study during his apprenticeship. An hour a day devoted to reading, would have paved the way for his future advancement. Although an industrious and diligent apprentice, he has neglected the opportunity. His attention was never directed to the scientific part of his education. No course of study was recommended to him, and no books pointed out as necessary or desirable. By his misfortune, and not his fault, he finds himself, at the close of his apprenticeship, incompetent to take a situation in any of the houses to which he has been advised to apply. Day after day he renews the research, and every evening returns to his lodging, weary and disappointed. What is to be done? He has staked his all on Pharmacy, and drawn a blank."

Parents and guardians, mark well the above. Masters of apprentices, tremble for your reputations as honourable men, in not having discharged the duty for which you have been so amply remunerated. Apprentices, behold the vast gulf that exists between you and such a knowledge of your vocation that would qualify you to perform those duties which you vainly believed you were prepared to undertake! Alas! alas! "What is to be done? You have staked your all on pharmacy, and drawn a blank!" How melancholy and heart-rending must be this intelligence!—the hopes of years blighted;—the glow of emulation, the aspirations of youthful and sanguine minds, chilled to zero;—usefulness, independence, the hope of honour and reward, alike annihilated at "one fell swoop," and the mind plunged into the deepest abyss of despair—dreary blank! But courage! a ray of hope gleams through the mist that our guardian angel has cast around; and after having delineated, with such vivid powers and truthful accuracy, the dilemma into which the tyro pharmaceutist has so unconsciously fallen, like a good Samaritan he finds a balm for the stricken heart, a panacea for the wounded spirit! Listen, O ye cast-down and benighted beings!—listen with bated breath to the sovereign remedy for your mental darkness! Lift up your diminished heads and hear, so that your deplorable ignorance may be dispelled! Listen! One hundred pounds, with twelve months devoted to instruction in the School of Pharmacy, and you are saved! Your feelings, as ours are, must be overwhelmed with gratitude; your eyes, as ours do, must grow dim with joy, for the immaculate, philanthrophic advice.

In sober sadness, we ask, what conclusion must parents and guardians come to after reading such stuff? That they have been duped out of an apprentice-fee, is evidently the least evil; and what will apprentices think of their masters, after being thus taught that their masters are impostors? They will, of course, treat with contempt that authority upon which their future welfare so much depends. We never have, nor do we intend to deprecate education; but we do deprecate and consider highly reprehensible the tone of such an article, and assert, with all the earnestness of the deepest conviction, founded upon the opportunities of observation, which intercourse with our own class has afforded, that the shop, of all others, is the place to afford that practical teaching which is so essential to the competent performance of the duties pertaining to the calling of a pharmaceutical chemist. Materia medica can best be learned in the shop, with the aid of books. Pharmacy can best be learned in the shop, from the varied preparations in the constant course of manufacture; and that practical knowledge of the business, which is paramountly important for success, can only be learned by the daily routine of occupation in the shop. To assert that young men are incompetent after the usual training of apprenticeship, is to assert that, hitherto, there have been no chemists and druggists competent to discharge the duties of their station. We admit that the attendance upon a course of botanical lectures is valuable, and also, that some instruction in chemistry is necessary, in order to pass the examining board of the Pharmaceutical Society; because, as a rule, the incessant occupation of the shop, in some degree, precludes that systematic study of these sciences which is necessary for their comprehension, although we by no means insist that the latter accomplishments are imperatively necessary for the successful pursuit of the business of a chemist and druggist. For unquestionably, greater eminence, in a worldly point of view, has been obtained, in most instances, by men who have not cultivated chemistry, or at least have not been remarkable for such acquirements, than by really scientific individuals; however, there is strong reason to believe that, in their case, success would have been more easy, and more complete, had such acquirements been superadded to their other qualifications. Finally, we recommend our young friends not to be disheartened, and to rest assured that their prospects are as bright now as in time gone by, even if what is called genius shall have been denied to them. There is a presumption, amounting almost to a certainty, that if any one will determine to be eminent in his profession, and will act with unvarying steadiness in pursuance of that determination, he will, if health and strength be given, surely succeed.

THE POSITION OF THE PHARMACEUTICAL SOCIETY.

In spite of the desperate efforts that are being made by the itinerant advocates of the Pharmaceutical Society to rekindle an interest in its proceedings, and to induce chemists and druggists to avail themselves of the opportunity, now presented under so-called auspicious circumstances, to become members, we are convinced that the Society will never regain its former position, whilst so much labour and time are occupied in endeavouring to point out the immense advantages, both actual and prospective, of the membership of this Society, instead of more profitably striving to create such advantages as would be evident to everybody, without the necessity of looking through the microscopes of these itinerant preachers, to perceive them.

There cannot be the slightest doubt, that a Pharmaceutical Society properly constituted, exercising its legitimate functions, and governed by men possessing intelligence and self-abnegation, would be a most valuable institution. The pharmaceutical community would not be slow to appreciate such a society, although, according to statements which we have seen in print, the provincial chemists are so extremely dull, that they require a simple measure like the Pharmacy Act to be expounded to them. If this be true, these gentlemen must possess a very humble opinion of their own capabilities, or else they would have resented the whole matter as an insult, by omitting to attend a meeting convened for such a purpose.

A greater proof cannot exist, to show that the Pharmaceutical Society has not, and does not supply a want long experienced by our brethren, than the fact that, since the establishment of the Society, the number of its subscribers has gradually but largely decreased, not only in London, where its benefits would be more sensibly experienced, but also in the country, instead of increasing, as its merits, if it possessed any, became more known and appreciated.

It is time that the Council of the Pharmaceutical Society should have learned, that the best method to cause their Society to prosper, was to make its advantages unmistakeably felt, by causing them to be in active existence, and not allow any man or journal to be eternally talking about that which has no reality.

It is all very well to rely upon a transient enthusiasm, created either by a cunning device or an accident, to induce men to support any project which can be accomplished whilst this enthusiasm lasts; but such a course will prove utterly unavailing when a society has, from year to year, to be supported by the cool convictions, founded on actual benefits received, of men who are called to supply the sinews of war, in the shape of subscriptions annually levied.

The warmest and most disinterested supporters of this Society cannot deny that it and its Act of Parliament are both failures, inasmuch as the good contained in them more than counterbalances the evil. Has it never occurred to these, its only valuable supporters, that in the place of apologizing for the defects of the Society, or magnifying its advantages, it would be wise if they were seriously to concert some measures by which the members might receive some great and continuous benefit from their connection with the Society, and render its membership a thing to be coveted by those who stand without its pale? Could a few honest men be brought together for this purpose, we feel assured that the Society would steadily acquire a position unparalleled in its history. To accomplish so desirable an object, the opinions and influence of those men who are deeply interested in maintaining their positions in the Society must be counteracted and avoided as a plague; for it is to their conduct that we can only ascribe the dissension which exists in this Society, and its humiliated character. Every well-wisher of this Society must be pained to find that men are going abroad, acting the part of medicants, to prevail on others to join a Society, which, if rightly managed, ought in the space of ten years to have occupied the proudest position of any society in this country—a position that would have compelled pharmaceutists to seek for its membership rather than the Society to be dragged through the mire by men petitioning on its behalf for supporters, or rather for the subscriptions which new members must pay, for it is not members these missionaries want, but their money.

Whatever the dominant faction may pretend to think to the contrary, they know, unless they possess even less intelligence than we give them credit for, that the resources of the Society must be ultimately administered in the manner which we have indicated. Their only object appears to be to postpone the abolition of the abuses and the institution of the reforms, which are essential for placing this society on an enduring basis, because this faction is the only party which derives any benefit from it, as it is at present mismanaged. Therefore, until somebody stands forward, strong enough and willing to fight for the necessary changes, matters must remain as they are, for it is too much to expect from human nature, that those who receive the profits of abuses shall be the men who will take the initiative in removing those abuses.

CASTOR OIL SOAP.

Stuncke states that castor oil saponifies readily with alkalies, and gives with soda a solid white soap, which, in the form of pills, is a certain and agreeable purgative.——*Archives der Pharmacie.*

AN IMPROVEMENT IN THE ANALYSIS OF MINERAL WATERS CONTAINING MAGNESIA.

BY H. SILLMANUS.

When a mineral water contains chloride of magnesium, the quantity of its fixed constituents cannot be determined with exactness, because the chloride of magnesium, by evaporation, is decomposed. To prevent this source of error, the addition of a sufficient and weighed quantity of sulphate of potash is an appropriate means. Various other additions, as carbonate of soda, and chloride of ammonium, have been already proposed; however, in both cases, a strong heat cannot be applied, because the carbonate of magnesia formed decomposes, and the chloride of ammonium is volatile. These evil results are prevented by the addition of sulphate of potash, whereby chloride of potassium, and a double salt of sulphate of magnesia and sulphate of potash, are produced, $2\,KO, SO_3 + Mg\,Cl = KO, SO_3 + MgO, SO_3 + KCl$.

The double salt, formed of sulphates of magnesia and potash, fuses in a red heat without decomposition.——*Annalen der Chem. und Pharm.*

THE QUALITATIVE DETERMINATION OF AMMONIA.

BY P. EINBRODT.

Small quantities of ammoniacal salts are easily overlooked by qualitative analysis. For the detection of ammonia in small quantities, the method of Rose is serviceable, which consists of boiling with caustic potash, and conducting the vapour into a solution of basic nitrate of mercury. This process occupies much time; it requires an appropriate apparatus; and in cases where fluids are examined, a doubt arises whether the potash has not passed over with the steam, and caused the brown precipitate. When the ammonical vapour is evolved in considerable quantities, the mercurial salt can be easily drawn into the tube which holds the fluid to be examined. To the ordinary method of testing for ammonia, by means of a glass rod moistened with muriatic acid, held over the fluid to be examined, to which potash has been added, no objection can be made. But every one will concede, who has been engaged in giving instructions in analysis, that this method for beginners is not sufficiently sure and delicate.

To remedy this uncertainty, I employ the following very simple method, which is founded on the facts, namely, that ammonia is a weaker base than potash, and that the behaviour of ammonia towards bichloride of mercury is different to that of the fixed alkalies.

When the solution is neutral in which the fixed alkalies have to be distinguished from ammoniacal salts, the end of a rod, moistened with a solution of caustic potash, is to be dipped therein. When the solution is strongly alkaline or acid, so much muriatic acid or potash must be added as will make it slightly alkaline.

If ammoniacal salts are present, its alkaline reaction can only arise either from a small quantity of free ammonia, or from ammoniacal salts formed with carbonic acid, boracic acid, or phosphoric acid. A few drops of a solution of bichloride of mercury are now to be introduced into the fluid. If only the fixed alkalies are dissolved in it, a yellow, or by the

presence of borates and carbonates, a reddish-brown precipitate is formed. On the contrary, if only a very small quantity of ammonia is present, it matters not with what acid it was originally combined, a white precipitate results.

As borax and the corresponding potash salts throw down, from a solution of bichloride of mercury, such a voluminous and intensely coloured precipitate, and, at the same time, exhibit alkaline reactions in diluted solutions, I believe that the smallest possible quantities of ammoniacal salts besides these borates may not be detected by my method. In other words, I hold it possible that, with a white precipitate a reddish-brown one is produced, which hides the former. However, the process shows, when conducted as above given, that only a white precipitate will be thrown down if only a trace of an ammoniacal salt is present. The result is the best guarantee of my method. The appearance of the white precipitate is incomparably more intense than that of the ammoniacal cloud; the reaction is thus extraordinarily delicate, and can be perceived without continued attention; only the delicacy of the method must not be driven to that point where, by the extreme dilution of alkaline solutions, bichloride of mercury produces, in a solution of potash, a varying white precipitate, which only becomes red when it is collected at the bottom of the test tube by boiling.——*Journal für Praktische Chemie.*

ARTIFICIAL FRUIT ESSENCES.

BY FEHLING.

Pine-apple Oil is a solution of one part of butyric ether, in eight or ten parts of alcohol. For the preparation of this ether, pure butyric acid must be first obtained by the fermentation of sugar, according to the method of Bensch*. One pound of this acid is dissolved in one pound of strong alcohol, and mixed with from a quarter to half an ounce of sulphuric acid; the mixture is heated for some minutes, whereby the butyric ether separates as a light stratum. The whole is mixed with half its volume of water, and the upper stratum then removed; the heavy fluid is distilled, by which more butyric ether is obtained. The distillate and the removed oily liquid are shaken with a little water, the lighter portion of the liquid removed, which at last, by being shaken with water and a little soda, is freed from adhering acid.

For the preparation of the essence of pine-apple, one pound of this ether is dissolved in 8 or 10 pounds of alcohol. 20 or 25 drops of this solution is sufficient to give, to one pound of sugar, a strong taste of pine-apple, if a little citric or tartaric acid has been added.

Pear Oil.—This is an alcoholic solution of acetate of amyloxide, and acetate of ethyloxide. For its preparation, one pound of glacial acetic acid is added to an equal weight of fusel oil (which has been prepared by being washed with soda and water, and then distilled at a temperature between 254° and 284° Fahr.), and mixed with half a pound of sulphuric acid. The mixture is digested for some hours at a temperature of 254°, by which means acetate of amyloxide separates, particularly on the addition of some water. The crude acetate of amyloxide obtained

* See this journal, No. 2, p. 43.—*Editors of "The Annals."*

by separation, and by the distillation of the liquid to which the water has been added, is finally purified by being washed with soda and water. 15 parts of acetate of amyloxide are dissolved with half a part of acetic ether in 100 or 120 parts of alcohol. This is the essence of pear, which, when employed to flavour sugar, to which a little citric or tartaric acid has been added, affords the odour of bergamot pears, and a fruity, refreshing taste.

Apple Oil is an alcoholic solution of valerianate of amyloxide. It is obtained impure, as a bye product, when, for the preparation of valerianic acid, fusel oil is distilled with bichromate of potash and sulphuric acid. It is better prepared in the following manner:—For the preparation of valerianic acid, 1 part of fusel oil is mixed gradually with 3 parts of sulphuric acid, and 2 parts of water added. A solution of 2¼ parts of bichromate of potash, with 4½ parts of water, is heated in a tubulated retort, and into this fluid the former mixture is gradually poured, so that the ebullition is not too rapid. The distillate is saturated with carbonate of soda, and warmed, when a solution of 3 parts of crystallized carbonate of soda, 2 parts of strong sulphuric acid, diluted with an equal quantity of water, are added. The valerianic acid separates as an oily stratum.

One part, by weight, of pure fusel oil, is carefully mixed with an equal weight of sulphuric acid. The cold solution is added to 1¼ parts of the above valerianic acid; the mixture is warmed for some minutes (not too long or too much) in a water bath, and then mixed with a little water, by which means the impure valerianate of amyloxide separates, which is washed with water and carbonate of soda. For use as an essence of apples, one part of this valerianate of amyloxide is dissolved in 6 or 8 parts of alcohol.

ON THE COMBUSTION OF COAL GAS WITHOUT FLAME.

BY POHL.

When a platinum crucible has been made redhot by means of a gas flame, and then the gas shut off to extinguish the flame, the heated appearance of the crucible disappears. But, if the gas be now turned on, and projected in a stream on the crucible which is still hot, but not visibly so, the crucible becomes again redhot, and can be maintained in that condition without the gas inflaming. There takes place in this instance, on a much larger scale, the well known experiment of Davy, which was performed with spongy platinum, and also with well cleaned surfaces of platinum, and which is accompanied with the slow combustion of the gas, and the formation of peculiar products of its oxidation possessing a remarkable odour. These phenomena have been produced with a platina crucible weighing twenty drachms, and containing one drachm of an earth; and it has been found that after extinguishing the flame, even 42 seconds can be allowed to elapse before the gas is turned on, yet the crucible will become again redhot. For incinerating substances difficult to burn, it has been found that by placing them on the cover of the crucible, in the presence of the air, the heat derived from the gas playing on the crucible, affords an effectual means to accomplish this object.

THE COMPOSITION AND CRYSTALLINE FORM OF CARBONATE OF AMMONIA.

BY SAINTE CLAIRE DEVILLE.

The analogies between both the powerful bases, potash and ammonia, are nearly constant, and their corresponding compounds have the same constitution and crystalline form. However, there are some exceptions. Thus, carbonate of potash, whose relations are so simple, cannot be made to agree with the complex carbonate of ammonia. I have confined my examinations of the latter to those relations which could be compared with those of potash, and consequently represent themselves as arising from compounds of the oxide of the hypothetical ammonium; my experience has led to the following results:—All compounds of ammonia with carbonic acid change into one body, the bicarbonate of ammonia, which is permanent by ordinary temperatures. This bicarbonate, when it is crystallized, has a constant composition, which approximates to the bicarbonate of potash. It can receive three different forms, two of which are incompatible. These crystals most frequently consist of right rhombic prisms; but in a particular case, they are found in oblique prisms. Consequently, a new instance of demorphism is hereby afforded.

There exist two sesquicarbonates of ammonia, of very remarkable instability. One of these, which I could measure with exactness, is distinguished from the sesquicarbonate of soda both by its form (a right rhombic prism) and by its constitution, which shows to me that this substance has not been yet prepared. When these crystals are exposed to the air they loose their transparency directly, and are converted to the middle into bicarbonate of ammonia. This phenomenon manifests itself both in water and alcohol; but it receives a particular character, which is observed when the salt is placed in a closed glass bell. In this case, the crystals give off a strong ammoniacal water, and on the broad blades of sesquicarbonate of ammonia is seen cut, so to speak, new surfaces, without the interior of the crystals appearing to have undergone a change. However, the new substance is not now unchanged, for it is bicarbonate of ammonia. It crystallizes then in rectangular octahedrons, with modifications, from the measure of which it appears that these crystals belong to the right rhombic prismatic system.

The neutral carbonate of ammonia does not appear to be able to exist at ordinary temperatures; for the salt which precipitates from a solution in alcohol of sesquicarbonate of ammonia saturated with ammonia, is always sesquicarbonate of ammonia.——*Comptes rendus.*

THE BEHAVIOUR OF WATER TOWARDS BORACIC ACID IN BORATES.

The boracic acid salts exhibit, according to Rose, a remarkable analogy with the corresponding carbonates, and the influence of water on both is very similar. Water will, from their salts, expel these weak acids. By the decomposition of the carbonates the separated acid is

evolved, whilst boracic acid, when expelled by its influence, remains in the fluid.

Boracic can often be separated from its salts by water, even more completely than carbonic acid. Rose has, a long time since, shown that ordinary borax, in its concentrated and very diluted solutions, behaves towards saline solutions, particularly towards nitrate of silver, in quite another way, and the water in the diluted solutions appears to separate the boracic so completely from the soda that it may be considered as a solution of caustic soda, in which hydrate of boracic acid is contemporaneously dissolved, without being combined with the soda.

By the recent research, the author shows how this decomposition of the borax can be recognized by the reaction on litmus paper, and at the same time by the eye. He also shows the analogies which exists between boracic acid and carbonic acid in their salts, by their behaviour towards ammoniacal salts, solution of bichloride of mercury, sulphur, and the sulphurets of arsenic and antimony.

REMARKS ON NITROGENOUS IRON.

BY H. L. BUFF.

While employed with the analysis of oxide of iron, the question arose,—What importance was to be attributed to the nitrogenous contents of various kinds of iron.

With a view of observing the behaviour of iron, I subjected it, when heated, to a stream of ammoniacal gas, and the results obtained at present are communicated in the following statement.

Iron wire heated in a stream of ammoniacal gas became brittle and crystalline, while the increase of its weight was 6 per cent; its specific weight was, before treatment, 7.416; afterwards, 7.145. Heated with soda and lime, ammonia was formed. When chloride of iron was decomposed with ammoniacal gas in a red heat, scales of tenacious metallic iron were obtained, which contained .043 per cent. of nitrogen.

Oxide of iron, prepared by precipitating an iron salt with ammonia, and reduced in a stream of ammoniacal gas, contained .079 per cent. of nitrogen.

The same oxide of iron reduced in a stream of carbonic oxide gas afforded by combustion, with bichromate of potash and chromate of lead, 1.8 per cent. of carbon. This carbonaceous iron, heated in a stream of ammoniacal gas, lost its deep black colour and became grey-white, and contained 1.159 per cent. of nitrogen.

From these researches, it may be concluded that the nitrogenous contents of the iron are dependent on its carbonaceous contents; but in what way the iron is combined with the carbon and nitrogen could not be determined by these researches. A continuation of this examination would be of interest, but the reduction must be undertaken on a large quantity, and at so high a temperature that the iron is obtained in a fused condition, by which its physical properties can be examined.——*Annalen der Chemie.*

NEW METHOD TO MAGNETIZE STEEL.

According to Hamann, a very strong magnet is produced when the ordinary practice is reversed, of first hardening the steel and then magnetizing it. He recommends that soft steel should be brought between the poles of a magnet or galvanic current in a redhot condition, and hardened by immerging the whole apparatus in water. English cast steel appears to be the best for this purpose, because it may be hardened by a low temperature.

COLOURED SILK COCOONS.

Roulin has obtained rose-red cocoons when he has fed silkworms on mulberry leaves which were sprinkled with Bignonia chica. The resulting product was of an intense a colour as the blue silk which the author had previously obtained in the same way by the application of indigo. He hopes to secure still better results. In these experiments, the leaves were not so often changed as could be wished, and the great heat was so unbearable to the silkworms, that nearly one-fourth of them were starved before they turned into chrysales. Further, the chica was applied of inferior quality, and in so small a quantity, that the silkworms did not for the last four or five days obtain any of it. The result was nevertheless to be considered as a favourable one.—— *Comptes rendus.*

A MEANS OF OBTAINING PURE OXYGEN FROM FUSED SILVER.

Lævol reports that the oxygen absorbed from the atmosphere by fused silver, can be expelled therefrom, by the addition of gold in a pure condition. When the gold is added in sufficient quantity to the silver, in a state of fusion, the evolution of the oxygen is so rapid, that an active effervescence takes place; and the boiling mixture consists of from two to three volumes of both metals.

ON THE PREPARATION OF COPAL VARNISH.

COMMUNICATED BY A MANUFACTURER.

In the preparation of copal varnish it is necessary to have the finest gum and the best linseed oil (not boiled oil) to make a good varnish, the quality of the varnish depending on these circumstances.

Into an iron boiler lined with tin, put the gum, which by as *quiet* and *sudden* a heat as possible must be liquefied, taking care to keep it well stirred with a wooden pole; immediately it is melted and has assumed the viscidity of castor oil, add the whole of the oil as *quickly as possible*, and keep it briskly stirred for half-an-hour. At the time of mixing the oil with the melted gum, the greatest danger is to be apprehended of its taking fire, owing to the high temperature required to melt the copal; to guard against accidents of this kind, it is necessary to have a strong iron cover to the boiler, and to keep the mixture excluded from the air. There is also another evil to be avoided, which is, that if the oil be not mixed in immediately the gum is melted, the latter will run into a

pulpy, soft mass, and be spoiled. The above hints will be found very useful to persons commencing the manufacture of copal varnish, a competent acquaintance with which can, however, be obtained only by much practice and experience.

EXTRACTS FROM THE EVIDENCE ON THE PHARMACY BILL, DELIVERED BEFORE THE SELECT COMMITTEE OF THE HOUSE OF COMMONS.

William O'Connor, Esq., called in, and examined.

Chairman.] Are you a member of the College of Surgeons?—No; I am a licentiate of Apothecaries' Hall.

Are you in practice as a general practitioner?—Yes.

Have you paid any attention to the subject of medical reform and the education of chemists?—Yes; I have paid considerable attention to it for some years past.

Have you any observations to offer to the Committee upon that subject?—Yes. I may state that I approve of a good deal of what I have heard stated to the Committee this morning by Mr. Ancell and by Mr. Propert on the subject of the Bill. I think that nothing is so essentially necessary at present as the better education of chemists and druggists, and I think that this Bill will, in a great measure, effect that object; but I think, at the same time, that the passing of it may possibly retard the progress of a better system of medical legislation, and I think that the absence of a clause in the Bill preventing the engagement of chemists and druggists in the practice of medicine, is a circumstance which is sufficient to create in the minds of medical practitioners very great apprehension with regard to the ultimate effect of the Bill; and supposing that apprehension to be well founded, the effect of the Bill would be very prejudicial, not only to the interests of duly qualified medical practitioners, but also to the health and welfare of the community at large. I think that all medical and surgical practice by chemists and druggists, whether counter practice, or visiting out of doors, should be strictly prohibited. I think there ought to be a clause to that effect.

Do you not think that this Bill would tend to introduce a better system, by defining a chemist and druggist to be a person not a member of the medical profession, and by not allowing any person practising medicine, surgery, or midwifery to be a member of the corporate body?—I think so; I see no objection whatever to the term "pharmaceutical chemist." I think it is one strictly describing the occupation of a chemist.

Do you not think that this Bill, which limits his practice to subjects not connected with the practice of medicine, and which limits the body to persons who are not medical men, would facilitate the carrying out of the views which you have stated?—I think it may perhaps be prudent to limit the education of chemists and druggists; but it is impossible for any legislative enactment to prevent a chemist and druggist from acquiring a most perfect knowledge of medicine. I think it is highly desirable that he should be as well educated as possible, not only with regard to his knowledge of pharmacy, but I think his general education should be good; it appears to me that the great difficulty has arisen from the mistaken position which chemists occupy in this country; and in order to give the Committee an idea of what the system on the Continent is, where chemists and druggists, as they are called here, are understood to be scientific men, I will, with the permission of the Committee, read to them a sketch of their course of education, written by Sir Robert Kane, the present President of the Queen's College at Cork.

We have already had evidence respecting the curriculum of examination of pharmaciens in France?—This is in Germany.

We have had also evidence as to the course of education in Germany.—Then, perhaps, it is not necessary for me to read this. I was about to mention, also, that at a medical congress held in Dublin, in June 1839, the object of which was to reform the medical profession, there were resolutions proposed by medical men from different parts of Ireland, and one of those resolutions was, "That encouragement should be given to scientific apothecaries (whose time would be exclusively devoted

to the preparation and compounding of medicines) by the establishment of a college of pharmacy, by preventing medical practitioners from keeping shops for the sale of drugs, or compounding the prescriptions of others, and by affording to regularly educated apothecaries an exclusive right in dealing in medicinal articles." A copy of that resolution, together with the others adopted at the congress, were forwarded by Doctor Maunsel, the Secretary, to the Council of the British Medical Association, of which Doctor Webster was President, and those resolutions, after mature deliberation, met with the unqualified approval and support of the council and members. I may state that the system of examination which I see proposed in the Bill, which is now before the Committee, is not, in my opinion, in any way objectionable. I do not see any objection to chemists and druggists being educated in toxicology.

But the word "Toxicology" being omitted in the Bill, do you see any objection to the other branches of education proposed?—None whatever. I have heard gentlemen, who have been examined here, object to a chemist and druggist being educated in botany. I cannot agree with them in it. I think nothing is more desirable than that a chemist and druggist should be conversant with medical botany; I think that that is a necessary and essential part of his education. If it might be permitted, I would make an allusion to some clauses of the Bill. If I understand it correctly, the effect of it will be to prevent any person who is not registered as a pharmaceutical chemist from keeping a shop, and I think it is highly desirable that medical men should be so prevented.

There is nothing of that sort in this Bill?—If there is not, I think it is highly desirable that there should be a provision of that kind, for I think the chemists and druggists will feel themselves justified in prescribing so long as medical men are allowed to keep shops and vend drugs, and not only drugs, but perfumery and other things.

Do not some apothecaries do that?—Yes; they sell hair brushes, perfumery, and other things, and in many of their shops you may see in the window soap at so much a square.

Mr. *Hindley*.] Where have you seen that?—In different parts of London; in shops kept by members of the College of Surgeons of London and Edinburgh M.D.'s.

Do you know anything of the qualifications of chemists and druggists as a body?—I do.

Are there many of them, do you think, who do not possess the proper qualifications?—Yes; I know that many of them are grossly ignorant.

Do you think that any persons who are grossly ignorant ought to be permitted to assume the name and to perform the functions of dispensing chemists?—No. I have had frequent opportunities of observing their state of ignorance.

Then you consider that a great evil exists at present?—Yes, a very great evil.

So that it is a choice of evils; a choice between existing evils, and the possible evils which might arise if this Bill were passed?—I think the evil is great as matters stand at present.

Do you think that the passing of the Bill in its present form would be beneficial, inasmuch as it would provide for the better education of chemists and druggists?—I think so; but still I think that the interests of the medical practitioner and the public require that a restrictive clause should be introduced into the Bill. I know it to be a common custom with chemists and druggists in England, and in London more especially, to have medical men go to their houses, where they give advice to parties who come to the chemist for it at certain hours in the day. Those chemists and druggists probably pay the medical man either by a fee or by a percentage on the medicine sold; parties go there for advice, which they think they receive from the chemist and druggist, and the chemist and druggist is in their eyes the medical practitioner, the name of the medical man being perfectly unknown. That is a practice which is carried on very extensively in London; and I think that in addition to the clause which has been suggested by Mr. Ancell, there ought to be a clause going still further, and preventing chemists and druggists from being directly or indirectly engaged in the treatment of disease.

Do you think that any Act of Parliament could prevent a medical man from practising where he may think fit?—It is difficult to do so, but I think a clause might be drawn which would inflict a penalty on parties so acting. I know that chemists and druggists in London, occupying no mean position, have been parties to such practices, and have had medical men sitting in their back parlours to receive

patients. Respectable people have gone to the shop thinking they got advice from the chemist and druggist, whereas they have got it from a medical man.

Lord Burghley.] Would you prevent all apothecaries from selling medicines, considering that many apothecaries practise in the country?—I would prevent all men who practise medicine from selling.

Would not that, in your opinion, create great inconvenience in small villages and towns?—There might be exceptions made in cases where they were remote from towns. I think that power might be vested in local magistrates, for instance, to allow it to be done in certain cases where it was proved to their satisfaction to be necessary, and that there was no chemist and druggist near where people could get drugs. I think that power might be vested in the local authorities to grant a licence in such cases to the medical practitioner to sell drugs for the convenience of the neighbourhood; it being understood that if a chemist and druggist, or a person duly qualified under this Bill, should establish himself in business in the same neighbourhood, the medical man should resign the power of vending drugs.

If you were to introduce a clause of that sort, would not the consequence be that a great opposition would be offered to the Bill by apothecaries and medical men?—I think that if a clause to that effect were introduced, and if there were also a clause strictly prohibiting chemists and druggists from engaging in counter practice, or visiting patients at their own houses, the medical profession could have no reason to complain, and would agree to it; and I think that, if they did not willingly agree, they ought to be made to submit to it. I know several chemists and druggists, persons doing large practice as medical men. I know one man who is doing a practice of at least £.500 a-year; his counter practice brings him in that sum. I may mention one instance which occurred to myself one day: I went into the shop of a chemist and druggist near Charing Cross, to get some medicine made up in a hurry for a patient of mine, and I was told by a person in the shop, "Mr. So-and-so will be in shortly; he is out now visiting a patient." Then I would make another suggestion to the Committee, which is this: that should this Bill become law, I do not see any clause in it giving any authority to inspect the drugs sold in the shops of chemists and druggists. I think it is very desirable that there should be a provision of that kind, and I think the absence of it is a great loss to the public at large; it might perhaps be difficult to carry it out satisfactorily, on account of the difficulty that there would be in finding in London, in the College of Physicians more especially, to whom generally such a power, where it exists, is usually entrusted, persons who would be conversant with the nature and quality of drugs.

You think that it would be desirable that there should be such a power introduced into the Bill?—I do. I have had occasion myself to complain of the quality of many of the drugs that are sold by chemists; and I know, from other medical men, that those complaints are general.

Do you think it could be expected to be otherwise, considering the great number of persons who enter into the business of chemists who are quite unqualified?—It arises, I think, from two causes; it arises from the fact of men entering into the business of a chemist and druggist without any previous qualification, and knowing nothing of the nature or quality of drugs; and in the next place, whatever may be the education that is given by the Pharmaceutical Society, I know that some persons who have been educated there are not themselves good judges of medicine. I think that the examination of a chemist ought to go much further than it does at present, with regard to the character and quality of drugs.

In other words, you think that the examination is not so stringent as it ought to be?—I think it is not so practical as it ought to be.

Do you think it possible that any voluntary society, not supported by Act of Parliament, could make the examination as stringent as it ought to be?—I think it morally impossible.

Do you not think that an Act of Parliament would enable the society to introduce that stringency in the examination which the safety of the public requires?—I think so.

And on that ground do you approve of the Bill?—I approve of the Bill, if the restrictions I have suggested are introduced.

Sir *W. G. Craig.*] Do you think that the mode of examination has been as yet imperfect?—It would appear, from conversations which I have had, that the examiners feel they have not power to go so far as they ought to go.

Do you think that the examiners at present are properly constituted?—I think that if a college of pharmacy is established, and if it is confined to practical pharmacy, chemistry, and botany, and to the tests for poisons, there could be no objection to it.

Would it, in your opinion, be an advantage, that members of the College of Physicians and Surgeons should be examiners?—Educated as they are at present, I think they are grossly ignorant in materia medica. I have in my pocket the questions which were proposed by the College of Physicians at the last examination, and there is not one in it relating to materia medica. There is one with regard to pharmacy, which is, "What are the special directions enjoined in the London Pharmacopœia of 1851, for the material and composition of the vessels employed in the preparation and conversation of metallic, acid, and alkaline medicines? In what sense do we use the terms 'calor lenis,' 'balneum aquosum,' and 'balneum arenosum?'" That is the only question relating to it. That is one of the last examination papers. I know men engaged in London as lecturers on materia medica, who really know nothing at all about it, although they go into the lecture room year after year, repeating the same thing from the writings of Drs. Murray and Christison of Edinburgh, Dr. Neligan of Dublin, or Dr. Pereira. There are many lecturing in London now on materia medica who are perfectly incompetent to discharge the office they assume, and some of those are members of the College of Physicians.

But there must be many members of the College of Physicians who are perfectly acquainted with pharmacy?—I will venture to say that there are not four such men in the whole body.

Would you say the same with regard to the surgeons?—It is ten times worse with regard to surgeons; they have no examination; their examination is of a most frivolous nature.

Chairman.] You mean so far as regards chemistry and pharmacy?—I mean as regards the education necessary to qualify a man to undertake the practice of medicine and surgery.

Did you consider it so frivolous that you did not think it worth while to go up and obtain a diploma?—I thought it would not be of any service to me; I thought my being a licentiate of the Apothecaries' Company was sufficient. Licentiates of the Apothecaries' Society receive a much higher, more practical, and far more general education than a member of the College of Surgeons, as tested by examination. I have been urged by some members of the council of the College of Surgeons to offer myself for examination for a fellowship. When I founded the National Association of General Practitioners, some members of the council, at that time, urged me to retire from it, and to go in for a fellowship of the College of Surgeons.

Sir *W. G. Craig.*] With whom would rest the power of examining drugs in the shops of chemists?—The College of Physicians have a limited power, which I believe is confined to the City of London. It should not be confined to drugs, but they ought to examine all scales and weights and measures, and they ought to see that the chemists have copies of the London Pharmacopœia. I know many chemists and druggists in London who have not. You will more commonly see "Hooper's Vade Mecum," or some such book, which gives them a smattering of the practice of medicine.

The power of examination of drugs, which is possessed at present by the College of Physicians, is not exercised, is it?—It is scarcely exercised at all; it is only confined to the City of London.

Do you think it desirable to extend that further, and to place it in the hands of some other body?—I would do so.

What body?—If there was a College of Pharmacy they might appoint, or if the education of the physicians was better than it is, the power might also be entrusted to some of them; but I would rather trust to a body of censors appointed by the College of Pharmacy; and I think they should be sworn to examine the drugs properly.

What penalties would you impose on parties possessed of impure drugs?—I would impose a fine for the first offence; I would increase it for the second, and the third time I would have them struck off the register of the College of Pharmacy. I would have them deprived of their licences or registers.

Would you make it imperative that the shops should be examined periodically?—Yes. I would have them examined all through the country, at least twice a year.

How would you provide for such an examination?—I think that the expenses might be paid for out of the funds of the Company; and I think that if all chemists and druggists in England were compelled to be registered annually, a sufficient amount would be derived from that source.

You would have an annual assessment?—Yes, for registering; and that would provide funds for the support of the college. I think also that they should be prohibited from vending oils and colours. I think that poisons should be kept apart, and that they ought to be prohibited from vending poisons as they now do, even when prescribed separately and in large quantities by medical men. I may mention that I have known two fatal cases arising from one medical man ordering poison. I knew of a physician, a very popular lecturer on materia medica, who at one time ordered a patient an ounce of prussic acid, two drops to be taken occasionally; that was dispensed from a chemist's shop. I was myself present and witnessed the fatal result of a physician having ordered an ounce of laudanum, two or three drops to be taken occasionally. The patient swallowed the whole ounce of laudanum, and was poisoned. I attended that patient myself, and removed the laudanum from the stomach; but the patient ultimately died.

TO CORRESPONDENTS.

S. H. S., Stafford.—For an explanation of the cause of fermentation in urine, see p. 264 of "The Annals of Pharmacy."

T. H. L., Woolwich.—1. Sugar of milk is obtained by the evaporation of whey. 2. We are not aware that the oil of gaultheria can be procured in England. It is an article of commerce in the United States. Its properties are aromatic. 3. The price of "The Prescriber's Handbook" is 6*s.* 6*d.*

J. T. Nash.—Noad's "Lectures on Electricity, Galvanism," &c., price 14*s.*

W. L.—The most simple, speedy, and efficient method to detect the adulteration of coffee with chicory and other substances is that afforded by the microscope. See "The Lancet," January 4th, 1851, containing an able article on coffee and its adulterations, illustrated with woodcuts.

A Manchester Druggist.—Rub the oil with the solution of potash, and by degrees add the syrup, and finally the infusion, during trituration.

J. J. T. R. Felton.—The Pharmaceutical Society has received no power from the Act to prevent any person, under any circumstances, from practising as a chemist and druggist. It can only prevent those not registered according to the Act calling themselves pharmaceutical chemists, but cannot interfere in any other way with their proceedings in the sale, preparation, or dispensing of medicines.

Chemicus, Manchester.—By taking as a guide the instructions supplied and the methods of research recommended by Scheerer, in the "Introduction to the Use of the Blowpipe," now in the course of publication in this journal, a large amount of experimental skill and experience may be acquired by those who are desirous of performing analysis by the least expensive and most simple means, namely, the blowpipe. In fact, a course of practical instruction on the blowpipe is a most valuable preliminary to other methods of chemical investigation. This instruction is admirably supplied by Scheerer.

A Subscriber, Sussex.—"The Principles and Practice of Dental Surgery," by Harris, which may be obtained of Ballière, Regent Street, London.

F. R. S., Manchester.—Tooth Paste:—R. Creta precip. ℥iij; Pulv. Irid. ℥j; Cocci Cacti, Potas. Subcarb. aa. 3j; Ol. Cassiæ, Ol. Caryoph. aa. gtt. xii; Mellis ℥iv; Aquæ ℥ij; misce secund. artem.

H. O.'s communication was received too late for insertion in the present number.

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